

IX “ICHTNOGRAPHY” —THE NUDE AND ITS MODEL THE ALPHABETIC ABSOLUTE AND STORYTELLING IN THE GRAMMATICAL CASE OF THE CRYPTOGRAPHIC LOCATIVE VERA BÜHLMANN

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VERA BÜHLMANN is senior researcher and lecturer at the Chair for Computer Aided Architectural Design (CAAD), Swiss Federal Institute of Technology (ETH) in Zurich. She studied English language and literature and philosophy at the University of Zurich, and holds a PhD from the Institute for Media Sciences, University of Basel. Her work revolves around a “quantum-semiotics” and “natural communication,” and explores how an algebraic understanding of code and programming languages enables us to consider computability within a general literacy of architectonic articulations. She is author of *Die Nachricht, ein Medium: Annäherungen an Herkünfte und Topoi städtischer Architektur* (Ambra, 2014). www.monasandnomos.com

This article discusses different modes of how the ominous “all” can be plotted as “comprehension” via narrative, calculation, and measurement. The main interest thereby regards how the apparent “Real Time” induced by the logistical infrastructures established by communicational media becomes articulable once we regard “Light Speed” as the tense-ness proper to spectral modes of depicting the real in its material instantaneity. The “real” in such depiction features as essentially arcane, and its articulation as cryptographic. The articulation of the real thereby takes the form of contracts. We suggest to take cryptography at face value, i.e., as a “graphism” and “script,” whose (cipher) texts we can imagine to

be signed according to a logics of public key signatures: while the alphabets that constitute such a script are strictly public, a cipher-text's "graphism" cannot be read (deciphered and discerned) without "signing" it in the terms of a private key. This perspective opposes the common view that we are living in "post-alphabetic" times, and instead considers the idea of an alphabetic absolute. This bears the possibility for a novel humanism, based not on the "book" (Scriptures) but on the laws of things themselves. The article traces and puts into profile classical positions—e.g., by Descartes, Leibniz, Dedekind, Cantor, Noether, Mach—on the role of "script" in mathematics, the possibility of a general and/or

universal mathesis, the role of measurement in relation to conceptions of "nature."

"In 1958 you wrote about alienation produced by non-knowledge of the technical object. Do you always have this in mind as you continue your research?"

Anita Kechickian

"Yes, but I amplify it by saying that the technical object must be saved. It must be rescued from its current status, which is miserable and unjust. This status of alienation lies, in part, with notable authors such as Ducrocq, who speaks of "technical slaves." It is necessary to change the conditions in which it is located, in which it is produced and where it is used

primarily because it is used in a degrading manner. [...] It's a question of saving the technical object, just as it is the question of human salvation in the Scriptures.”

Gilbert Simondon

THEME ONE, PLOT ONE: HUMANISM

BLESSED CURIOSITY

When Michel Serres was invited to give a talk in celebration of the 150th anniversary of the school he attended, Lycée Saint-Caprais in Agen, France, he used the occasion to share what he calls “a confession.” It is a short and humorous text, full of tender memories about all sorts of more or less innocent mischief, but it also places a ruse that both supports as well as upsets the honorary frame of generational sequentiality in which he had been invited to speak. “God has given us the endless freedom to disobey him, and this is how we can recognize him as our Father,” Serres sets out, and continues: “Scarcely installed in the terrestrial Paradise, Adam and Eve quickly eat the apple and pips, immediately leaving that place of delights and fleeing towards hazy horizons. Only a few months old, the infant tries to say no; those among you who raise children will learn this and know it in overabundance.”¹

The presumptuous ruse Serres has placed in this “boring preamble of mixed theology and natural history,” as he calls the story of expulsion, the ruse from which he wittily distracts also by the grandness of the opening address in the first sentence, is a small change in the setup of the Great Story:² when Adam and Eve give in to their human and purportedly corruptive and nonnatural inclinations for curiosities, they already have a

- 1 Michel Serres, “La confession fraternelle,” *Empan* 48 (2002): 11–16; originally a public lecture at Lycée Saint-Caprais, Agen, on the occasion of the school's 150th anniversary (in 2000). Here cited from the unpublished “Fraternal Confession,” trans. Kris Pender, https://www.academia.edu/11074066/Michel_Serres_-_Fraternal_Confession.
- 2 Editorial note: Especially in the beginning of this text, I use a range of words in capitalized spelling; I do so to indicate that these words are used here as titles—words in sheer formality that are expected to implicate capacities and responsibilities that are not attributable to the authority of a particular referent. Considered as titles, they rather implicate entire narratives that can be plotted in uncountable versions; the criteria for electing such words here were purely contextual.

child, in Serres's account. Thereby Serres purports nothing less than a naturalization of sexuality within God's own likeness—Adam and Eve have a baby that must have been conceived and born *before* the disrespectful act had been committed! This mischief introduces into the narrative of the Tree of Life nothing less than an abundance of directions in which it might descend and branch off. What presumptuousness, indeed! One that dares to set out, high-spirited, light-humored, and quick, for nothing less than the Total, the Ultimate Sum, by unsettling the earthly grounds in which the Tree of Life roots.

But how could such ground possibly be unsettled? Serres assumes that the Nature of the Human must, as everything else as well, be thought to factor in a Universal Nature—a nature of the universe—whose path of descent is divine (omnipotent) and decided (lawful) *as being undecided*: it is a nature capable of developing in an uncountable abundance of directions, progressive ones as well as regressive ones. Such nature then must count as essentially arcane, a secret that can be preserved only in a “crypt,” as Serres refers to it elsewhere.³ Of course we know the term crypt from the architecture of churches, but it once meant more generally a “vault, cavern,” being derived from the Greek verb *kryptein*, “to hide, to conceal,” by nominalizing the adjective that was built from this verb.⁴ For Serres, there is a path for knowledge to access universal nature, but never a plain, pure, and immediate one. All knowledge is a reduced model of universal nature, a model that does not seek to represent that nature, but rather a model that seeks to keep alive as best as it can that nature's character: to be secretive. The entire *raison d'être* of such Knowledge is to serve and obey—unconditionally, absolutely—nature's secretive character. Such obedience can only be performed through disobedience, through mischief, through the comic. It can be performed by inventing a reduced model of the Secret, and this without the assurance of being initiated to it. Universal Nature's secretive character can count as neither private nor public, as neither esoteric nor established insight; rather, we can refer to it as constitutive for both in a manner of which Serres maintains that only Law can be.⁵ Knowledge then embodies Law in the building of a Crypt, a vault, one that is growing deeper and vaster, more intertwined and winding, from the act of being frivolously explored, challenged, tested, strained in the very solidity in which it is built. To keep the Secret that is Universal Nature demands Absolute Obedience without tolerating submission: its secret indeed has one vulnerability, namely that obeying it can be confused with doing so in a servile manner. Serres calls the Evangelist—the mes-

- 3 Michel Serres, “Noise,” trans. Lawrence R. Schehr, *SubStance* 12, no. 3 (1983): 48–60, here 55. The article makes up chapter 1 of Serres's 1982 book *Genesis*, trans. Geneviève James and James Nielson (Ann Arbor: University of Michigan Press, 1999 [1982]).
- 4 *Online Etymology Dictionary*, s.v. “crypt,” http://www.etymonline.com/index.php?term=crypt&allowed_in_frame=0.
- 5 Serres, “Fraternal Confession,” 8.

senger that claims to bring the Good News with no mediation necessary for receiving it—“Satan the Master of the world.”⁶ Other than she who strives to master the universe’s secret by keeping it encrypted, and who spends her time in that very vault that doesn’t cease to challenge and take issue with the earthly grounds where the iconic Tree of Life is rooted, she who strives to master the world “leads you to a very high mountain, shows you all the kingdoms in all their glory and promises to give them to you on condition that you grovel before him.”⁷ If knowledge of the Universe’s Nature is a Crypt, knowledge of the world is the crypt’s Flat Projection in terms that claim the authority to represent the crypt’s arcane. Such flat projection alone can claim to produce “positive” or “negative” knowledge; the crypt on the other hand embodies knowledge that is always already articulated, knowledge that presents insight only by leaving absent what it has intuited. Serres’s seeker of articulate knowledge, whom he addresses as the Researcher, serves the Law, she is an “official” whose duty it is to explore and challenge all the regularities that have been stated as lawful—without ever claiming to represent those regularities with official authority. “We always save ourselves by the law. Freedom comes from laws,” Serres tells his audience.⁸ Law binds and contracts the ambient terror of the jungle, in a manner that allows “a balance between hunting and being hunted, between eating and being eaten.”⁹ Law contracts violence. If those contracts are sound, whoever is subject to it can afford to live and care for all that is vulnerable as the source of all that is improbable and precious. With these elaborations, we can perhaps better appreciate the radicality of Serres’s confession: “I continue to make mischief in order to bear witness in the face of the world that we are not beasts, that therefore we have left or begin to leave the hell of violence, because we are men.”¹⁰ In Serres’s humorous Confession Story, giving in to the human inclination to be seduced by curiosity ceases to be a tragic act. Rather, it is the Researcher’s Official Duty to enjoy masquerade, to be transgressive by engaging in the challenges that motivate desire and seduction, pleasure and satisfaction, pain and relief. This is comic, and yet it is serious: a researcher “cannot cheat.”¹¹ For “to obey, here, consists in submitting oneself to the laws of things as such and to thereby acquire freedom, whereas cheating consists in submitting oneself to the conventional laws of men.”¹² In Serres’s inversive account where the universe has an active nature, rather than being imagined as either static or dynamic, cheating becomes equivalent to being obedient (to the laws of man),

6 Ibid., 7.
 7 Ibid., 6.
 8 Ibid., 8.
 9 Ibid., 6.
 10 Ibid., 7.
 11 Ibid., 7.
 12 Ibid.

and disobedience comes to count as blessed rather than cursed: “Things contain their own rules. Less conventional than the rules of men, but as necessary as the body that falls and the stars that revolve; even more, difficult to discover. We can do nothing and should do nothing without absolute obedience to these things, loyal and hard. No expertize happens without this, no invention, no authentic mastering. Our power comes from this obedience, from this human and noble weakness; all the rest falls in corruption towards the rules.”¹³

For the researcher and the comedian, disobedience, as it characterizes the tragic manner of acting, is not thought to be nourished by delusions, to produce regret, anguish, and guilt that can be relieved only by comfort derived from acknowledging the principle impotence to which such “acting” is always already sentenced. Quite inversely, the very possibility for disobedience comes to feature in Serres’s account as that which is capable of preserving the possibility of salvation. Acts of comic disobedience replace the Scriptures as that which preserves and circulates that possibility. What in the Scriptures unfolds between the Two Covers of a Book (or the top and the bottom of an inscription plane, be it stone, clay, papyrus, or parchment) is thereby attributed a different status by Serres: the mediacy of what unfolds between the covers—on the limited inscription plane or the numerous sheets contained in a book—is attributed to be capable of capturing, conserving, and expressing a sense whose extension as meaning is *in principle* of vaster magnitude than that which the two covers (or the limiting ends of a plane) are Officially Entitled to contain.

In Serres’s narrative, Adam and Eve have a child before they taste the pleasures of transgression and disobedience. With this, sexuality is decoupled and set free from being ascribed the prime motive animating the play of sinful seductions. And suddenly there is the possibility of a distance, a Genuine Mediacy capable of discerning a human world as a *Locus in Quo* that spans between the traditionally purported Covers of the Scriptures, the “original” act of *Divine Judgment* that is said to have predicated the nature of all that is, and the act that is consequential to Eve and Adam’s frivolity of tasting from the forbidden fruit, namely the *Divine Sentence* with which the ancestors of humankind are sent into expulsion, the act that leaves the Disobedient Ones alone with the representatives of Official Generality as the sole placeholders for a source of comfort. If, on the other hand, the divine entitlement of the covers is to preserve the possibility for disobedience, then the titles with which they express what they capture and conserve must pass on the *virtually abundant activity of possible disobedience* they are to guard in the service of duty they are to represent. Just like the plane of inscription they limit, or the sheets they bind, the covers too need to be capable of capturing, conserving, and expressing a sense whose extension as meaning

13 Ibid.

is *in principle* of vaster magnitude than that which the two covers are *officially* entitled to contain.

In other words—and this, again, is Serres’s adorable humor—if you hold respect and esteem for official representations, then never trust official representations, especially while paying service to the law they represent! In an admittedly twisted but not really complicated way, as I have tried to depict, it is their entitlement as official representations to take care of their capability to compromise themselves. “To compromise” here is an important albeit dangerous term that I am using to translate the German word *Bloßstellung*, which means something like embarrassing exposure, a kind of personal vulnerability that comes from “lowering one’s guard” (*sich Blöße geben*). The guards of an official representation would of course be the official order, and what Serres then tells us is that the official representation must in turn have “capabilities of mediacy,” namely the capability to transmit and pass on the *virtually abundant activity of possible disobedience*—which it is entitled to delimit and protect—to the official order that is predicated to guard and protect, in its turn, the official representations.

Like Eve and Adam’s child in Serres’s narrative, and like the unfolding mediacy between two entitled limits, the entitled limits as well must be respected in their divine nature, and this divine nature consists in being endowed with the possibility for disobedience. This very possibility is being guarded in Serres’s narrative, and it is what renders it capable of still preserving the plot of a story of salvation, despite the frivolous masquerade of that plot’s prime characters in which Serres engages as the narrator of that story’s novel articulation: “Contrary to what is sometimes said, this blessed disobedience solves many problems. In accumulating black follies and an experience which helps nobody, each generation blocks history so that we no longer see, in a moment, how to leave it; only children sometimes unblock the situation by seeing things in another way. Animals rarely disobey; genetic automates, some follow an instinct programmed since the origin of their species: that is why they have no history. We change, progress and regress, we invent the future because, deprogrammed, we disobey.”¹⁴

If Eve and Adam were with child *naturally*, before their frivolous act, then all those humanisms would be mistaken that purport that humankind has been left alone in the world, with the sole and tragic spirituality of a Regulative Machinery (instead of an arcane architectonic body of laws) that operates obediently and reliably in official generality, and that it is the tragedy of humankind that the very possibility for comfort is a finite good that this machinery must administrate to as best as it can. Because if Eve and Adam were with child naturally, the Tree of Life fol-

¹⁴ Ibid., 1.

lows a sequential order too, which descends, branches off, but doing so in many directions and in no preset manner—history does not distance mankind from its lost original nature that had, purportedly, been corrupted when history begins. The sequential order now includes the possibility for Regression just as much as for Progression. Human nature now is not *good* nature—the spheres of “nature” and “value” are kept distinct now, they are kept apart by the Encryptions and Decipherments depicting the secret that is the universe’s nature, those Symbolic Building Blocks of the crypt that embodies the law obeyed by the kind of universal human nature of which Serres speaks. But if it is Codes that manifest those “building blocks” of the Crypt, the Great Story that knows the Age of the Tree of Life, what then are those “codes” made of?

THE ALPHABETIC ABSOLUTE

I would like to suggest that we can think of this “materiality” as the Alphabetic Absolute. And I do not mean by this, of course, a particular linguistic alphabet to be now declared foundational and unconditional; I don’t even mean an alphabet of language, in any restrictive sense. Rather, I mean alphabets in a generalized sense, as applied in coding—numerical ones, linguistic ones, probabilistic ones, *any* ones. So what then counts as an alphabet? It is important to distinguish what can be called an alphabet from an inventory of signs, for example. An alphabet does not ever relate to things themselves, but to how one “speaks” when articulating something at stake. I put speak in quotation marks, because with such a generalized notion of the alphabet as I am suggesting, we can say “articulate” instead of “speak,” and thus all kinds of practices that articulate something—by composing elements, caring for junctions, for flexibility and conjugation (interlinking), practices that nest different hierarchies—can all be included in the kind of “speech” measured by an alphabet. This indeed may sound stranger than it is; it is well known for example that the letters for writing words and those with which we count and calculate share the same genealogy: both depend on an abstract place-value system within which they can operate. Numbers are depicted as numbers in the terms of a particular numerical value taken as the base of that system—sixty in the hexadecimal number system, ten in the decimal one, and so on. The letters of a script, on the other hand, are depicted within a finite set of characters that are arranged in linear sequentiality—the very name “alphabet” means exactly this: alpha and beta were the first two letters of the Greek alphabet. Thus, when suggesting of speaking of an alphabetic absolute, what I mean is to think of whatever it may be to which one feels inclined to ascribe a status of being impartial and unconditioned (absolute), as being an articulated crypt. The codes that can articulate such an absolute as a crypt need alphabets to build it from—rather than, for example, “notational systems,” because a notional system would already be too specific, for

it would imply a set of rules according to how the letters that operate within a place-value system can be combined. It is the power of an alphabet that many such syntaxes—more inclusively, such grammars—may be applied to it (there are very different languages coexisting, all using the Roman alphabet, for example). It seems to me that only an alphabetic absolute can integrate the kind of unconditional obedience Serres talks about, requiring as it does that one behaves wittily and mischievously. An alphabet does not yet distinguish false from correct usage, as a notational system would. We know the word Literacy in relation to the alphabet for precisely this reason: to be literate is pre-specific (undecided) with regard to whether one speaks/writes poetry, lies, wants to convince with arguments, or persuade with plausibility and opinion. And still, literacy can be measured—in terms of power of expression, imagination, distinction, elegance, being informed, and so on. But there are varieties of different metrics. In this, the Masterful Literate is someone who is literate more or less masterfully, as we are used to call a musician masterful, or an architect, or a doctor, or she who cares for and masters whatever practice. That is why the kind of unconditional obedience Serres talks about ought to be granted to an absolute that is alphabetic, a total of any alphabet conceivable, including all possible “couplings” and “multiplications” that constitute the ciphers articulated in codes. What I have called Serres’ “Officer” is a literate person in just this sense: she is the architect of articulated crypts that hollow existing standards.

There is another reason why the Alphabetic seems to deserve a central role here. In all his writings Serres hails a novel humanism where history is not the consequence of a terrifying act of punishment and expatriation.¹⁵ Literally: “God has given us the endless freedom to disobey him, and this is how we can recognize him as our Father,” he maintains.¹⁶ Hence, a stance is needed that allows for coexistence of what is disparate.¹⁷ If the Tree of Life descends without linearly and progressively distancing us “contemporaries” from our origin, then originality is always “there,” and the Universe’s natural kinds, we have said, are many. This peculiar “there-ness” Serres suggests calling “noise”: “We must keep the word

15 It is not the place to elaborate on this here, unfortunately, but some of Serres’s major books must at least be mentioned: *Hominescence* (Paris: Le Pommier, 2001); *Le tiers instruit* (Paris: Bourin, 1991); *Atlas* (Paris: Éditions Julliard, 1984); *Petite Poucette* (Paris: Le Pommier, 2012); *Le contrat naturel* (Paris: Bourin, 1990); *Récits d’humanisme: Bour* (Paris: Le Pommier, 2006); *L’incandescent* (Paris: Le Pommier, 2003).

16 Serres, “Fraternal Confession,” 1.

17 I borrow this expression of the “disparate” from Gilles Deleuze’s philosophy of asymmetrical synthesis of the sensible: “Repetition is [...] the formless power of the ground which carries every object to that extreme ‘form’ in which its representation comes undone. The ultimate element of repetition is the disparate [*dispars*], which stands opposed to the identity of representation. Thus, the circle of eternal return, difference and repetition (which undoes that of the identical and the contradictory) is a tortuous circle in which Sameness is said only of that which differs.” Gilles Deleuze, *Difference and Repetition*, trans. Paul Patton (New York: Columbia University Press, 1994), 57.

noise, the only positive word that we have to describe a state that we always describe negatively, with terms like disorder.”¹⁸ For Serres, seduction, desire, and pleasure, and the existence of sound and fury, are natural forces that forever disturb pureness and harmony. They are the very conditions for the possibility of disobedience, and hence, also for the possibility of a kind of beauty that is beautiful because it can be compromised, embarrassed, exposed, and vulnerable—in short, “naked.” In an article to which I will turn shortly, Serres calls this beauty, which is pure because it can be embarrassed, “la belle noiseuse,” the beautiful querulent.¹⁹

THE COMIC

Let us first come back to this aspect of the coexistence of the Disparate. The possibility of salvation, in the terms of “natural morals,” as Serres suggests, depends on the inversion of the idea of illusion and its opposite, truth. Disguise, masquerade, fashioning, and dressing up do not pose a threat to truth; rather, they are the conditions for it to be self-engendering, alive, sexual. A lot depends on recognizing reality as mediacy, and immediacy as illusion, Serres seems to tell us. Curiosity now appears as a stance that is neither sinful nor just, but then what? Curiosity diverts the attention that can be granted. It animates a play of amusement; it is quick and can never be at rest with what attracts it; it is a form of appreciation that depends on no intermediate didactic, appreciation that is possible in an unexpected encounter. All of this binds curiosity to the Comic. Early forms of comedy are said to originate in pagan manners of emancipating from traditional cults of worship; in their rituals of thanksgiving, for example, where particular Gods were celebrated, they began to frivolously dramatize the characters of these gods in masquerade. They would still perform the rituals, but now in a challenging rather than entirely serious manner. Comedy is older than tragedy, and it is purported as a manner of dealing with magnitudes one encounters as evidently “there” but disparate, non-fitting, without knowing how, why, or what else. The very possibility of a thinking of repetition as something that does not reproduce the same depends on the comic; for example, in Serres’s manner of thinking of the sequentality of time in his tree of life.²⁰ Comedy shares its origin with the carnivalesque, and in many ways it can be said to mark the early stages of coming of age—the youth going through comic situations when challenging the customs, expectations, and orders of their parents. Serres’s assumption of considering a nature and a sexuality of the universe itself has an important and difficult implication: it involves the assumption

18 Serres, “Noise,” 55.

19 Ibid.

20 Gilles Deleuze has devoted an entire study to such a notion of repetition; see Deleuze, *Difference and Repetition*.

of different kinds of natures, and hence morals of nature, that are all to be considered “universal.” This has consequences for science that considers a particular system of concepts universal (metaphysics), as well as one that considers physical nature as universal (“modern” science). In either one, the paradigm of a plurality of natural kinds translates into the assumption of categorically different and incompatible magnitudes—magnitudes that are, because they are categorically different, strictly *not* to be experimented with. Indeed, all attempts, however experimental, to disobey the rule of traditional hierarchies of subordination among the different magnitudes are then perceived outright as evil: we can easily remember the trials of Galileo or Kepler for assuming, in the case of the latter, an elliptic instead of perfectly round path of the planets (heavenly bodies), and hence addressing the course of the stars in the category of an imperfect circle. That was sheer frivolity and disrespectful in the eyes of the clerics at the time: the orders of the heavens, locus of the divine, could not possibly correspond to a measure that captures imperfect movement, because it would imply that what is moving, in the starry heavens, are magnitudes whose purity is corrupt and imperfect. It would imply that the most perfect and pure order, that of the heavens, would be the order of imperfect magnitudes. When Galileo and Kepler might stand for an endpoint of the reign of a particular dogmatism, we can see perhaps in Dante Alighieri’s *Divina commedia* an early announcement of what was to come. If today media apologetics are concerned with the Post-human, and a purported End of History, we can easily see a certain symmetry to the situation for which the names of Galileo and Kepler stand; and again, we have a much earlier literary work that seems to indicate such a development to come, namely Balzac’s monumental *Comédie humaine*, whose idea, he tells us in the preface, “originated in a comparison between Humanity and Animality.”²¹ Because “it is a mistake,” Balzac maintained, “to suppose that the great dispute which has lately made a stir, between Cuvier and Geoffroi Saint-Hilaire, arose from a scientific innovation.” At stake is the idea of a *Unity of Plan*, the idea that “the Creator works on a single model for every organized being.” This issue does not arise from scientific innovations, he insisted, rather “unity of structure, under other names, had occupied the greatest minds during the two previous centuries.”²² He goes on to name references and their core concepts in addressing the issue at stake:

As we read the extraordinary writings of the mystics who studied the sciences in their relation to infinity, such as Swedenborg, Saint-Martin, and others, and the works of the greatest authors on Natural History—Leibnitz, Buffon, Charles Bonnet, etc., we

21 Honoré de Balzac, “L’avant-propos de la *Comédie humaine*” (1842–48), here cited from the translation “Author’s Introduction,” *Project Gutenberg*, <http://www.gutenberg.org/files/1968/1968-h/1968-h.htm>. There are no page numbers provided in this online reference.

22 Ibid.

detect in the *monads* of Leibnitz, in the *organic molecules* of Buffon, in the *vegetative force* of Needham, in the correlation of similar organs of Charles Bonnet—who in 1760 was so bold as to write, “Animals vegetate as plants do”—we detect, I say, the rudiments of the great law of Self for Self, which lies at the root of Unity of Plan. There is but one Animal. The Creator works on a single model for every organized being. “The Animal” is elementary, and takes its external form, or, to be accurate, the differences in its form, from the environment in which it is obliged to develop. Zoological species are the result of these differences. The announcement and defence of this system, which is indeed in harmony with our preconceived ideas of Divine Power, will be the eternal glory of Geoffroi Saint-Hilaire, Cuvier’s victorious opponent on this point of higher science, whose triumph was hailed by Goethe in the last article he wrote.²³

As Balzac announces, he himself had been convinced of such a scheme of nature (a unity of plan) long before his contemporaries raised its issue in terms of scientific innovations, and hence in a manner supposedly set apart from the spiritualism entailed by the authors on natural history—as if now it wouldn’t imply unanswerable questions anymore. So Balzac doesn’t refer to this scheme as a frame of reference for explaining particular postulates of scientific accounts. Rather he takes it as an inspiration for a kind of investigative storytelling: “Does not society modify Man, according to the conditions in which he lives and acts, into men as manifold as the species in Zoology?”²⁴ And further on: “If Buffon could produce a magnificent work by attempting to represent in a book the whole realm of zoology, was there not room for a work of the same kind on society?”²⁵ Somewhat surprising perhaps, his *Comédie* is all set up as a great project of taxonomy and categorization: “The differences between a soldier, an artisan, a man of business, a lawyer, an idler, a student, a statesman, a merchant, a sailor, a poet, a beggar, a priest, are as great, though not so easy to define, as those between the wolf, the lion, the ass, the crow, the shark, the seal, the sheep, etc.”²⁶ But “the limits set by nature to the variations of animals have no existence in society. [...] The social state has freaks which Nature does not allow herself; it is nature plus society. The description of social species would thus be at least double that of animal species, merely in view of the two sexes.”²⁷ Furthermore, “animals have little property, and neither arts nor sciences; while man, by a law that has yet to be sought, has a tendency to express his culture, his thoughts, and his life in everything

23 Ibid.

24 Ibid.

25 Ibid.

26 Ibid.

27 Ibid.

he appropriates to his use. [...] The dress, the manners, the speech, the dwelling of a prince, a banker, an artist, a citizen, a priest, and a pauper are absolutely unlike, and change with every phase of civilization.”²⁸ In consequence, Balzac decides: “Hence the work to be written needed a threefold form—men, women, and things; that is to say, persons and the material expression of their minds; man, in short, and life.”²⁹

But still, if this introduction is to set up Balzac’s project in clear demarcation to a scientific account, how should it be possible to embark upon such an immense project of taxonomy and categorization *in the manner of storytelling*? For Balzac the realist writer, such storytelling could only take the form of a natural history—yet a natural history of manners. Manners, if studied in a historical manner that works empirically, pose entirely new problems for a writer because they must be considered as what we would call today perhaps “a population effect” or “property of a collective.” But how to address abstract ideas such as a collective and its properties with enough intuitable distinction and common sense to work as a story? Balzac indeed asks himself: “But how could such a drama, with the four or five thousand persons which society offers, be made interesting? How, at the same time, please the poet, the philosopher, and the masses who want both poetry and philosophy under striking imagery? Though I could conceive of the importance and of the poetry of such a history of the human heart, I saw no way of writing it.”³⁰

The way of writing that he eventually found was one of categorizing typicalities of entire scenes: “Not man alone, but the principal events of life, fall into classes by types. There are situations which occur in every life, typical phases, and this is one of the details I most sought after.”³¹ And furthermore, he specifies, the possibility of his writing depended upon setting up a gallery: “It was no small task to depict the two or three thousand conspicuous types of a period; for this is, in fact, the number presented to us by each generation, and which the Human Comedy will require. This crowd of actors, of characters, this multitude of lives, needed a setting—if I may be pardoned the expression, a gallery.”³²

Balzac, the great realist author of the nineteenth century, pursued capturing the richness of reality by embracing typification, masquerade, and modeling as means to work out—against our established and well-tested intuition!—the truly fine distinctions that make reality “real.” Such storytelling ceases to lend its services to a representational paradigm; instead, it informs a new paradigm of writing and storytelling that doesn’t fit well with the modern categories of either fiction *or* documentary, either history *or* story. Balzac was clearly fascinated by the novel

28 Ibid.

29 Ibid.

30 Ibid.

31 Ibid.

32 Ibid.

methods of population thinking, statistics, and the analytical capacity of these methods to at once resort to gross generalizations, as well as to reveal infinitesimally fine distinctions. Furthermore, he was well aware that the invention of electricity would profoundly unsettle the order of societies: “In certain fragments of this long work I have tried to popularize the amazing facts, I may say the marvels, of electricity, which in man is metamorphosed into an incalculable force; but in what way do the phenomena of brain and nerves, which prove the existence of an undiscovered world of psychology, modify the necessary and undoubted relations of the worlds to God? In what way can they shake the Catholic dogma?”³³ It was clear to him that there is something “heretic” about these interests in the kind of abstract possibility that is owed to technology and scientific innovation. This is why I have suggested seeing in this work an early premonition of the themes that preoccupy intellectuals today—themes like an end to history, or post-humanism—that are rather straightforwardly tied up with a certain apocalypticism.

MEDIACY AND REAL TIME

Gilbert Simondon, whom I cited at the beginning of this text, follows the same idea when he claims that the grand theme of alienation that haunts modernity, and the so-called industrialization of societies, depends upon finding ways to save the technical object:

I believe there are humans in the technical objects, and that the alienated human can be saved on the condition that man is caring for them [the technical objects]. It must in particular never condemn them. In the Old Testament, there is a sort of jealousy of Yahweh toward the creature. And we say that transgresses the creature. But is not all creation a transgression? I think transgression, whose origin is the serpent, is the creation of a person. If Adam and Eve never left the Garden of Eden they would have not become human beings or inventors. Their one son was a shepherd, the other a farmer. Techniques were born there. Finally, technics and transgression seem to be the same. Blacksmiths were once considered as cursed.³⁴

Simondon argues that what is called “human alienation” cannot be separated from our custom to degrade the technical object to a passive and servile status. The theme of alienation demands for the grand theme of salvation to be articulated on new grounds, he maintains. If, classically, the possibility for salvation is remembered, preserved, and articulated in the Scriptures—their theological as well as hermeneutic readings—we must make and reserve room now for an essentially arcane and enigmatic kind of possibility in new media. Marshall McLuhan, Friedrich Kittler, and

33 Ibid.

34 Simondon, “Save the Technical Object,” 2.

many other new media apologetics have suggested that with electronic media, we are living in “post-alphabetic” times; this entails that it is not the Scriptures that preserve and communicate the possibility of salvation anymore. Without elevating the technical object (its unconcealed and naked “naturalness” alias “pure functionality”) from its servile and passive status, we are living in a terrifyingly inhospitable and infinitely open universe, thus Simondon. Kittler, for example, but many others as well, see in this perceived inhospitality the pain of a narcissistic wound, which however turns into a new promise of salvation (although he would probably never say that) if only we lose our arrogant narcissism. Then this inhospitality can be perceived as the true recognition of the human, existential predicament, and the tortures of history would “end”: the post-alphabetic age that characterizes the end of the Gutenberg Galaxy is then conceived as the end of history—an end that is at the same time its completion, its infinitesimal self-reference, a dynamics that completes itself by being infinitary. This is a logic we can find developed with subtle care also in Giorgio Agamben’s writing. It is not that within history’s infinitary completion through self-reference there would be no salvation possible—rather, the promise of salvation is now tied up in the burden of bearing an irresolvable paradox, namely that the object of salvation must be unsavable. Salvation does not concern the active recovery of what was lost and the remembering of what was forgotten. In Agamben’s argument, “the lost and the forgotten do not demand to be found or remembered, but to remain such as they are, in their being-thus.”³⁵

McLuhan takes a different path. For him, the end of the Gutenberg Galaxy doesn’t mean the End of History according to the above logic. Where the latter can be characterized as raising an anthropological stance to an absolute status, by addressing history as a political subject, McLuhan remains more committed to physics and science. For him, the post-alphabetic means the implosion of the experimental stage for objective representation in models of a universal “All” that is to be both origin and destiny of any scientific symbolization. In a quantum-magnetic, electronic universe, every medium adds something to reality, McLuhan insists. Along with the new scale, it introduces units, meters, and measures that permit mediating magnitudes with magnitudes, open-ended and infinitarily so: “It is the medium that shapes and controls the scale and form of human association and action.”³⁶ With this view, McLuhan spiritualizes communicative activity such that communication takes on quasi-cosmic dimensions. It is not magnitudes anymore that are universal and therefore allow for reliable measurement; rather, in the mediacy that renders the real as real, measurement constitutes magnitudes, not the other way around: “Before the electric speed and

35 Alex Murray and Jessica Whyte, eds., *The Agamben Dictionary* (Edinburgh: University of Edinburgh Press, 2011), 193ff.

36 Marshall McLuhan, *Understanding Media* (Cambridge, MA: MIT Press, 1994 [1964]), 9.

total field, it was not obvious that the medium is the message. The message, it seemed, was the ‘content,’ as people used to ask what a painting was *about*.”³⁷ So on the one hand McLuhan spiritualizes communication in relation to the human scope of action and, hence, in relation to existence, if not to Being itself. But on the other hand he discredits, on objective grounds (by referring to the quantum kind of physics that made possible electromagnetic communication technology that in principle, if not in fact, operates at the speed of light), the very possibility of a prophetic word that supposedly reaches one via artifacts from a categorical beyond of this world; rather, the message (prophetic or not) that *can* be received, he maintains, is virtually *any* message: “The electric light is pure information. It is a medium without a message.”³⁸ If virtually *any message is no message* than any actual message is a particular modulation of the generic actuality—movement in infinitive form—that McLuhan finds represented in the electromagnetic physicality of whatever it may be that moves at light speed. His dictum that the message needs to be looked for as immanent to the medium can be seen as answering to exactly this complex issue: in a quantum-magnetic, electronic universe, he tells us, every medium adds something to reality. This has hitherto been associated with the (potential) tremendousness of a cosmic order, but certainly not with a (potential) prudence of an anthropological one: “This is merely to say that the personal and social consequences of any medium—that is, any extension of ourselves—results from the new scale that is introduced into our affairs by each extension of ourselves, or by any new technology.”³⁹

All technology counts, for McLuhan, as extensions of “man”—this cannot only be understood in terms of an augmentation of corporeal strength and the perceptive faculties, but also intellectually: technology incorporates mathematical principles invented or at least intuited by “the intellect.” With the herewith implied emphasis on the mathematical symbolisms that unlock novel scales of action, once they are externalized and embodied in technical “cases” and then reappropriated by our bodies in learning how to use them, McLuhan also insists that mathematics is an articulation of human intellect—however “natural” or “divine” one might specify the possibility of such “intellection.”⁴⁰ In this, Kittler parts ways with McLuhan. For him, mathematics is the *immediate* expression

37 *Ibid.*, 13.

38 *Ibid.*, 8.

39 *Ibid.*, 7; also see my book, *Die Nachricht, ein Medium: Generische Medialität, städtische Architektur* (Vienna: Ambra, 2014).

40 This is not a polemical remark. With regard to mathematics, the question really is unsettling: Why does mathematics work? Why can we fly to the moon and back with mathematical understanding (and everything that builds upon it)? Stephen Hawkings edited an anthology on number theory, whose title features a citation by Leopold Kronecker, who once said: “God made the integers; all else is the work of man.” (Cited in Eric Temple Bell, *Men of Mathematics* [New York: Simon & Schuster, 1986], 477.) The Hawkings-edited anthology is entitled *God Created the Integers: The Mathematical Breakthroughs That Changed History* (Philadelphia: Running Press, 2005).

of “the real,” directly, in terms of physics. He sees no symbolism at work in it: “What distinguishes the post-Gutenberg methods of data processing from the old alphabetic storage and transmission monopoly is the fact that they no longer rely on symbolic mediation but instead record, in the shape of light and sound waves, visual and acoustic effects of the real.”⁴¹ With this assumption, he can mock Balzac’s project:

Photo albums establish a realm of the dead infinitely more precise than Balzac’s competing literary enterprise, the *Comédie humaine*, could ever hope to create. In contrast to the arts, media do not have to make do with the grid of the symbolic. That is to say, they reconstruct bodies not only in a system of words or colors or sound intervals. Media and media only fulfill the “high standards” that [...] we expect from “reproductions” since the invention of photography: “They are not only supposed to resemble the object, but rather guarantee this resemblance by being, as it were, a product of the object in question, that is, by being mechanically produced by it—just as the illuminated objects of reality imprint their image on the photographic layer,” or the frequency curves of noises inscribe their wavelike shapes onto the phonographic plate.⁴²

For him is clear: finally, “of the real nothing more can be brought to light than [...] nothing.”⁴³ With the nineteenth-century concept of frequency, “the real takes the place of the symbolic,”⁴⁴ and “literature defects from erotics to stochastics, from red lips to white noise. Marinetti’s molecular swarms and whirling electrons are merely instances of the Brownian motion that human eyes can only perceive in the shape of dancing sun particles but that in the real are the noise on all channels.”⁴⁵ The end of the Gutenberg Era marks for Kittler the end of storytelling, because, as he puts it, once the real takes the place of the symbolic within the physics of electromagnetic spectrums, frequencies, and stochastic noise, time turns into “an independent variable”—a “physical time removed from the meters and rhythms” that could make harmony and music. Rather, such physical time “quantifies movements that are too fast for the human eye, ranging from 20 to 16,000 vibrations per second.”⁴⁶

41 Geoffrey Winthrop-Young and Michael Wutz, “Translator’s Introduction: Friedrich Kittler and Media Discourse Analysis,” in Friedrich Kittler, *Gramophone, Film, Typewriter*, trans. Geoffrey Winthrop-Young and Michael Wutz (Stanford, CA: Stanford University Press, 1999), xxvii–iii.

42 Kittler, *Gramophone, Film, Typewriter*, 11–12; he quotes from Karl Philipp Moritz, “Die Hahnische Litteralmethode,” in *Die Schriften in Dreissig Bänden*, ed. Petra and Uwe Nettelbeck (Nördlingen: Greno, 1986), 1:157–58.

43 Kittler, *Gramophone, Film, Typewriter*, 15.

44 *Ibid.*, 26.

45 *Ibid.*, 51.

46 *Ibid.*, 24.

For both McLuhan as well as Kittler, media come to stand in for the Kantian forms of intuition, those “conditionings” supposedly innate to the human mind that, according to Kant’s transcendentalism, were the guarantors that everyone can intuit space and time uniformly, if only they have already learned to discipline their faculties of understanding and reason.⁴⁷ Kant molded his forms of intuition according to notions of space and time informed from physics, not mathematics. Against the rationalism of Leibniz, for example, which cannot do without an idea of beauty that is harmonious and theological, mathematics had to be decoupled from theology for Kant: it should only be legitimate if its postulates can be made the object of physical experimentation. With this, Kant aligns closely with empiricist traditions. But against Newton, whose systematization of methods in physics, *The “Principia”: The Mathematical Principles of Natural Philosophy*, anchors his Axioms, the Laws of Motion, in a notion of absolute space that he attributed to the cosmos itself, Kant’s transcendentalism introduced a level of mediacy between thought and the real. This “mediacy,” however, is entirely distinct from the “mediacy” thematized with reference to “new media.” While the former notion of mediacy was uniform and objective because Kant simply attributed Newton’s prime cosmological assumptions (linear and reversible time, and Euclidean, three-dimensional [plane] geometry) to the human mind instead of the cosmos (as the Forms of Intuition). Mediacy in relation to new media, on the other hand, is new because it makes so-called nonclassical quantum physics its point of departure. With the crucial consequence that the notion of an objective and uniform process of mediation—arguably the key element in Kantian transcendental philosophy, as well as for every epistemology that commits itself to the critical tradition—has lost its very base. When everything happens “instantaneously,” and at “light speed,” how to maintain a critical distance to events then? How to “base” a notion of mediation that is manifold, variate, and unfolds in multiple linear sequences that all link up in a not entirely predictable manner, within the probability space of one linearity, rather than one that is schematic, uniform, and goes along a mechanical causal line? How indeed to do so once “mediality” forms into different strata because what constitutes it (be it the Kantian forms of intuition, the letters in language, the numbers in arithmetics, the forms in geometry) loses its neutral and transparent character—that character captured in the saying “Never trust the messenger if it is not a mechanism.” Contemplating a notion of the real vis-à-vis such mediacy, McLuhan dares to consider a nonapocalyptic reversal in the direction

47 Regarding the problem of aesthetics and judgment for epistemology at large, see Robert Harvey and Lawrence R. Schehr, eds., *Jean-François Lyotard: Time and Judgment* (New Haven, CT: Yale University Press, 2001); and Jean-François Lyotard, *The Differend: Phrases in Dispute*, trans. Georges van den Abbeele (Minneapolis: University of Minnesota Press, 1988 [1983]).

of progress that inheres the paradigm of modern experimental science, whereas Kittler (as well as Agamben, Baudrillard, and many others) considers a self-referential implosion of the real, and anticipates a novel kind of immediacy arising from a totalized notion of mediacy.

HOW TO ADDRESS THE TENSE-NESS OF RADIOACTIVE MATTER
IN THE UNIVERSE'S INSTANTANEITY?

So what about Serres's *la belle noiseuse*? What about his idea of a kind of beauty that is not harmonious, not perfectly adequate or equal, but clamorous and querulous noise, a beauty that is universal, omnipotent, and yet "sexed" in the sense that it is "whole" only because it "desires" itself in all that it can be? A truth, a nakedness, whose beauty is pure only because it is vulnerable and can be embarrassed? Why hold on to the idea that truth must be beautiful, desirable, and natural? Serres too engages in making sense of a reality that is counted as universal, in a manner that whatever happens happens at light speed and its understanding depends upon mediation by spectra. For him, spectra render the real, so to speak. But rather than imagining the universe as a Grand Vacuum, a container of a natural balance (Newton) or a Grand Harmony, the substance of God (Leibniz), or the locus where History can complete itself by referring, dynamically, to nothing but itself (Kittler), Serres inverts the perspective. The universe is ill thought of as a container because it is expanding; thus a key passage in a recent lecture by him entitled "From Rotating Revolutions to an Expanding Universe."⁴⁸ Different from Kittler, he shares with McLuhan the view that mathematics works symbolically, not "immediately." But if media are extensions of man for McLuhan, then this same relation is incomplete if we think of one as a function of the other. Rather, this relation must count as mutually implicative and reciprocal for Serres: one may regard media as extensions of man, but man, equally so, extends media. The real is real because it is mediate, for Serres, in the precise sense that if we want to consider a universe that is not only dynamic but also expanding, all relations must be thought of as mutually implicative and reciprocal. In all consequence then, Serres maintains that physics itself is "communicational." For him, "information circulates universally within and between the totality of all existing things." He elaborates:

Bacteria, fungus, whale, sequoia, we do not know any life of which we cannot say that it emits information, receives it, stores it and processes it. Four universal rules, so unanimous that, by them, we are tempted to define life but are unable to do so, because of the following counterexamples. Crystal, indeed,

48 Michel Serres, "Information and Thinking" (manuscript of keynote address, conference of the Society for European Philosophy and Forum for European Philosophy, "Philosophy after Nature," Utrecht, September 3, 2014), 1.

rock, sea, planet, star, galaxy: we know no inert thing of which we cannot say that it emits, receives, stores and processes information. Four universal rules, so uniform that we are tempted to define anything in the world by them, but are unable to do so because of the following counterexamples. Individuals, but also families, farms, villages, cities, nations, we do not know any human, alone or in groups, of which we cannot say that it emits, receives, stores and processes information.⁴⁹

The real then must count as a noisy totality of communicative circulation among all existing things. It is to this that the witty ruse he placed in the Great Story's beginning responds—the ruse that universal nature itself is sexed and that the first act of transgression and pleasure (the disobedience to the father by eating from the forbidden tree) is natural and blessed; the ruse that keeps the beginning of the great story open in its development, indeterminate and yet natural, and contemporaneous to every generation anew. Isn't this the essence of modernity?

There is one key moment that Serres's inversion depends on: light speed may well be "real time," but it is not "instantaneity" or "immediacy"—rather, we must assume a universal "tense-ness" (*Zeitlichkeit*) proper to the totality of quantum-physical matter. Light speed then must be understood in relation to this tense-ness: it manifests the tense-ness proper to the totality of quantum-physics matter in its proper activity. The physical nature of the universe is neither static, mechanical, nor dynamic, it is radiating and active, which today's science refers to with the term "radioactivity." Galaxies are born from, and bearers of, radiation emitted from the activity of nucleosynthesis. From a quantum-physics point of view, this radiation is what we call "light." In each of the myriad galaxies, light matter is emitted from a sun. And it is this radiation of light that contemporary physics depicts in the technical image of a spectrum. In the totality that is depicted as a (whole) spectrum, light is called white—the sum of all the colors it distinguishes according to variable frequencies of white light.⁵⁰

Now, if real time refers to the tense-ness of light speed proper to the universe that is not only dynamic but also expanding, Serres insists that there must be a kind of storytelling that corresponds to such universality. There must be a kind of storytelling that "locates" itself in the peculiar tense-ness of this fourfold universal activity. For Serres, thinking itself is this storytelling: "What is thinking, in fact, if not at least carrying out these four operations: receiving, emitting, storing, processing information?"⁵¹ Thinking is all of the attributes philosophy has endowed

49 Ibid.

50 See Michel Serres and Nayla Farouki, eds., *Le trésor: Dictionnaire des sciences* (Paris: Flammarion, 1997).

51 Serres, "Information and Thinking," 1.

it with in the past: judging, reasoning, understanding, conceiving, imagining, remembering, discerning, delineating, measuring, expressing, articulating, etc., but it never strives to master an object (or a subject matter, a theme) by revealing its bare identity. Thinking is storytelling for Serres because its dignity (power) consists in preserving and transmitting truth, not in possessing or subjecting it. She who is a masterful thinker, then, is she who knows how to masterfully not know what she preserves, transmits, and keeps in circulation.

I will try to show that such storytelling, for Serres, is intimately tied up with painting: a spectrum is the totality of all colors—the Eigenvector, the generic characteristics of all colors. Thus the question becomes how to “paint articulately” the noisiness that is matter-in-terms-of-a-spectrum. If there can be a kind of storytelling here, it is because, unlike for Kittler, a spectrum counts for Serres as the “elementariness” of geometry, as constituted by symbolism and not immediate physical expression. Its form is, ultimately, mathematical. The spectrum is a *topological homology in time*, an apparatus, while a technical image that depicts a spectrum is a *snapshot of this apparatus’s dynamics at a certain point in time*. Images of spectra do not, properly speaking, represent anything specific, instead they facilitate the transmission and exchange of something arcane that is being conserved and invariant in circulation; they facilitate a “technical fiction” that conserves and transmits a “physical plot.” This is not merely a metaphorical manner of speaking, for light in today’s astrophysics indeed facilitates the exchange and circulation of energy quanta (light in quantum physics has particle-like properties because the “packages” [photons] in which light is discerned, measured, and depicted in spectral analysis are distinguished according to varying frequency rates that depend upon the “energy load” they “carry”). And energy is defined ultimately in no qualitative way at all, but solely as a quantitative invariant whose assumption allows for qualifying matter in its specific forms (“matter” as the Other of “light”).⁵² All one assumes to know about energy is that the total amount in the Universe is invariant—energy cannot be created nor can it decay.⁵³

The storytelling Serres envisages, hence, must be considered as symbolic or mathematical storytelling, as storytelling that works according to what the information-technological paradigm of communication suggests, to which Serres reverts. But how can it be tied up with painting? Serres wrote an article entitled “Noise” on Balzac’s 1845 short story “Le chef-d’œuvre inconnu,” translated as “The Unknown Masterpiece.”⁵⁴ I will try to elaborate on this relation between Serres’s kind of storytelling and painting by

52 See Richard Feynman, *QED: The Strange Theory of Light and Matter* (Princeton, NJ: Princeton University Press, 1985).

53 See Yvette Kosmann-Schwarzbach, *The Noether Theorems: Invariance and Conservation Laws in the Twentieth Century* (Vienna: Springer 2011).

54 Honoré de Balzac, “The Unknown Masterpiece,” trans. by Ellen Marriage, *Project Gutenberg*, <http://www.gutenberg.org/files/23060/23060-h/23060-h.htm>.

discussing the plot of this story. This discussion itself will be “communicational” and “narrative” in the sense that it seeks to “actively” preserve the issue at stake in the plot “depicted.” “Actively” means that I will add something to how both of them retold that story; this is what each of them did as well. Balzac tells the story of two historical figures, painters, that both tried to tackle the same problem: if perfect beauty can or cannot be discerned from the relation between nakedness and the model in nude drawing or painting. But in his story of these two historical characters, Balzac “doped” the historical “data” to be documented by adding a fictional character, a third painter whom he calls Frenhofer, as a symbolic operator that acts upon and complicates the documented “plot” (of a real event) and that allows Balzac to dramatize that plot fictionally. With this “tactical move,” Balzac’s realist account turns into storytelling (rather than being documentary-like), and it raises a novel aspect from the historical “plot”; namely, the issue of a categorical difference between drawing/sketching (working with lines) and painting (striving to work with color alone).

Serres, in turn, retells that plot, and how Balzac communicates it, by applying a tactical move once more: he in turn “dopes” the plot by endowing it with an aspect that neither Balzac nor the two historical painters raised. He introduces the element of a theoretical term from architecture—“ichnography.” Within the categorical term of ichnography, the depiction of that same plot (how beauty can be discerned from the relation between nudity and the model) comes to “conserve” and “transmit” again all that has been told, and then some more. Balzac’s interest was in how this can be enriched in distinctiveness by extracting a notion of drawing from painting (rather than interpolating a notion of painting from drawing). For this, he goes from Balzac’s planarity to voluminosity (he introduces the architectural terms for planning that keep the three dimensions distinct from one another by introducing the infinitesimal into each one separately—namely, ichnography, orthography, and scenography).⁵⁵ In Serres’s account, the notion of ichnography is capable of establishing a contractual kind of writing, as we will see. Painting affords a kind of writing that cannot be reduced to any other form of writing, because its encryption constitutes a graphism that is not “whole”—it needs to be doubly articulated to be a graphism. It needs to be articulated in terms of form to correspond to the substance’s expression of what the form contains, and it needs to be articulated in terms of content to correspond to what the articulation of the form expresses.⁵⁶ It is a kind of writing that literally inscribes “nothing,” by placing a signature whose subject

55 For a rendering of this classical triad into the paradigm of computational architecture, see Ludger Hovestadt, “Toward a Fantastic Genealogy of the Articulate,” in *Domesticating Symbols: Metalithicum II*, ed. Vera Bühlmann and Ludger Hovestadt (Vienna: Ambra, 2014), 46–93.

56 For the theory of double articulation see Louis Hjelmslev, *Prolegomena to a Theory of Language* (Madison: University of Wisconsin Press, 1961 [1943]).

does not, properly speaking, exist. This is why in Serres's account the unknown masterwork is indeed a masterwork—because it is both at once “unknown” and “signed.” It “has” a master, but no master can “own” it: by leaving the trace of something unknown that is absent, the signature marks a void that is universal not in the sense of a Great Vacuum, but in the sense of a vault or Crypt. It is a writing capable of remembering what has not yet happened, and even what might not ever happen. It is a kind of writing that transmits between generations without needing the assumption of a linear order of descent and sequentiality.

With giving us this notion of ichnography Serres must not, as McLuhan does, spiritualize communication and announce a novel age of speech based on post-alphabetic presentism (the global village). And neither must he, as Kittler or Agamben do, totalize History and submit to it as the subject of an entirely generic kind of humanism. I will try to show in my retelling of the plot (if beauty can be depicted from the relation between nakedness and its model) that, with Serres, we can expect the dawn of an alphabetic absolute from exactly those developments that lead the former two to announce a post-alphabetic era. The storytelling Serres envisages, we said, must be considered as symbolic, or mathematical storytelling, as storytelling that works according to what the information-technology paradigm of communication suggests, to which Serres reverts. This mathematicness, this symbolism, Serres links to painting via this notion of ichnography. My point is that ichnography introduces a categorical aspect into how we can “paint,” how we can depict something entirely in terms of “color,” which links the canvas of a painting to the spectrality of light as color in its purity prior to the painting that takes a snapshot (a technical image) of this spectrality. Via the categorical aspect that ichnography introduces, both spectrum as well as painting are regarded as forms of writing in Serres's peculiar “graphism” that is not “whole” without being “read”; a graphism that needs to be doubly articulated by both the writer and the reader; a graphism, hence, that is essentially contractual. Like a contract that expresses a mutually agreed assurance of what is not going to happen. In order to assure what is not going to happen, a contract tries to articulate all possible aspects of something the parties agree (by signing it) is not going to take place. All the while, and this distinguishes a contract from an order, the parties of a contract are not subjects to an external authority that is to be held responsible for guaranteeing that this “something” (which is not supposed to happen) be “represented” in adequate manner. A contract is signed if both parties withdraw from the stance that could claim legitimate authority over the other. In this sense, Serres's theory of the “light speed” of “real time” that media reality is approximating with its electronic communication-technology infrastructures can be said to agree to what McLuhan and Kittler (and others) mean by characterizing our time as a post-alphabetic age. But we have to look carefully.

In the paradigm referred to as the Gutenberg Galaxy, writing was meant to have an authoritative status firmly tied up with, and legitimated, via the role of an author in relation to her statements, counting on her authenticity and sincerity with regard to *knowing how to render the representation of an object (of discourse) plainly*, in uncorrupted, a-subjective manner. In science and philosophy, this author-driven legitimation framework manifests in argumentative discourse and in the technical precision of experimental practice. But in art, it manifests—more straightforwardly perhaps than in the latter two—in the attempted act of capturing in painting, drawing, or sculpture a model's “neutral nakedness”—the very plot depicted and doped by Balzac and Serres in different manners. Instead of truth, it is nakedness that here ought to be called “neutral.” Just like an experimental scientist strives to capture truth in its nonbiased, uncorrupted quality, any artist is striving—against all odds—to encounter, to glance at, to capture and preserve, by drawing, painting, or sculpture, a model of purity in a manner that strips the pure off the model's live and finite body. Such a successful act of capture would preserve beauty in its pureness. Isn't that why we call nude paintings/drawings/sculptures, at least in German, by the term *Akt*? Nudity cannot be worn; nudity cannot be represented—just like “actuality” in the Greek sense of infinitive activity, *energeia*, that can never be referred to without imposing form upon it (de-fine it), and hence corrupt its infinitive-ness by putting it into proportion, by applying regularity and measure. New media theory (as opposed of the theory of mediation that forms the backbone of transcendental idealism) readily declares the very possibility of such an act of capture impossible. All acts of capture are mediated, either by aesthetic categories, history, or a cruelty of the real itself, alias History. Hence it is this very notion of a legitimate authority that is tied to an alphabetic order that Serres also wants to dispose of. But what characterizes Serres's stance as unique is that he suggests replacing the concept of authority with a concept of mastership whose subject, however, is indefinite because it is never wholly present nor wholly absent.⁵⁷ It is the subject of his novel humanism—a humanism whose dignity (power, nature) consists in how different generations succeed or fail in preserving their mark of distinction: the possibility for mischief, the possibility for blessed disobedience. If generations indeed build together on a pyramid

57 That is why the law must remain undecided in how to address this subject of Serres's novel humanism. This aspect is worked out by Serres in his book *The Natural Contract*, trans. Elizabeth MacArthur and William Paulson (Ann Arbor: University of Michigan Press, 1995), where he makes the strong case that the fragility of the earth, as we begin to experience it in our concern for the planet's climate, needs to be addressed primarily in the terms of law and philosophy together with logic and science—a constellation, he argues, that ecology does (can) not provide. See also my article, “Cosmoliteracy: The Alphabetization of Nature” (lecture manuscript, conference of the Society for European Philosophy and Forum for European Philosophy, “Philosophy after Nature,” Utrecht, September 3, 2014), <http://monasandnomos.org/2014/09/08/on-michel-serres-book-the-natural-contract-1990-cosmoliteracy-the-alphabetization-of-the-nature-of-thought/>.

of shared knowledge, as a popular way of thinking about science suggests, then the “mastership” that organizes the subject of this humanism consists in *masterfully not knowing* what is being kept safe by this structure of collective architecture whose beginning—*arché*—never ceases to happen *in real time* as long as this knowledge is considered to be universal knowledge in the sense discussed above—demanding obedience without submission, and embarrassed, humiliated, and exposed if being “served” in the submissive manner of false modesty that claims to merely represent it without contributing, by occluding its clarity or adding to it. For Serres, the pyramid of knowledge does not store a resource; rather, it is a crypt that keeps originality itself as the secretive well of a power of invention that can be sourced continuously, without ever growing distant in time.

Thus, in my own retelling of the plot of the story, I will furthermore “dope” the way this plot can be told. I will attempt to endow Serres’s notion of ichnography with a grammatical case that is capable of addressing the locus in quo of the pyramid, the crypt, that is being built on the distributed and discrete base of ichnographical—architectonic—writing. I will call this grammatical case, “the case of the cryptographic locative.” Of this locative I want to postulate that it is capable of addressing, and hence articulating, *the locus in quo* where the plots of Serres’s Great Story are being preserved—that is, the locus in quo of knowledge. Grammatical cases can be seen as categories that organize the instantaneity of a “real time” that pertains to an alphabet—they articulate all possible relations that can be expressed in an alphabet-based language (the possessive, the dative, the nominative, the accusative, or whatever cases a language may distinguish).⁵⁸ Cryptography now can be seen as articulating the space “in between” different “alphabets” in a “comical” way, not unlike light and colors articulate the space in between different things. Hence, we can imagine the totality of the cases that can be expressed by the grammatical categories as building a spectrum, just like we think about the totality of all colors as building a spectrum. The cryptographic locative then articulates this spectral mediacy of the totality of grammatical cases. It articulates this mediacy (the “nakedness” of pure grammatical relations) by (1) depicting the sum total of the possible cases (the topological homological invariances) they specify in “analogue” manner—i.e., in the technical image that depicts a spectrum where frequency amplitudes are the sole criteria of distinction; and (2) by establishing “digital” communication channels on the spectrum basis of this totality of all cases. Like this, the cryptographic locative attributes a locus to what is real without ever having actually happened and taken place. In other words, it demarcates traces of an encounter between the

58 There are languages in use today that distinguish as many as twenty-something different cases. See Louis Hjelmslev, *La catégorie des cas: Étude de grammaire générale* (Munich: Fink, 1972).

real and the symbolic, and it is capable of preserving a kind of possibility that can never be fully known or exhausted. I would like to think of this grammatical case of the cryptographic locative as indexing what happens in the peculiar tense-ness proper to the radiating, emitting, and absorbing communicational activity of “real time”—the universal activity that leaves on our planet traces of *some of all* that happens “at the speed of light” in the galaxy that the earth belongs to.

THE UNKNOWN MASTERPIECE: THE DEPICTION OF NOTHING-AT-ALL

Serres introduces his article “Noise” with the words: “The story I am going to tell happened in the beginning of the seventeenth century, a time of noisy quarrels whence came the body of reason, beauty, genius that we admire today.”⁵⁹ But at the same time, Serres’s storytelling has nothing to do with keeping records of events: “The story I am going to tell and that Balzac tells could not have happened, never happened.”⁶⁰ I would like to consider taking this setup for how Serres’s story is to be encountered literally; that is, under the assumption of an alphabetic absolute. With such consideration, I want to ponder the possibility of addressing the fictional in a particular manner that neither opposes it to the real, nor subsumes either to the terms of the other and hence effectively does not subject one to the regime of the other. My interest is moved by Serres’s statement that in this story, we can witness a meeting between the real and the symbolic. He challenges our imagination: “Who has ever seen a meeting between the real and the symbolic in the story?” Balzac did witness such a meeting, Serres claims in the continuation of his text; he can know this, he says, because of the manner in which Balzac signed his text.

Let us first recall in broad strokes the plot of Balzac’s story. There are three painters: young Nicolas Poussin, the middle-aged court painter Franz Pourbus (whom Balzac calls Porbus)—both of whom were real seventeenth-century French painters—and Balzac’s invented older artist, Maître Frenhofer. Frenhofer visits Porbus at his lodgings, where he meets young Poussin as they are both arriving. Porbus lets both of them in, assuming on no particular grounds that Poussin was with Frenhofer. Frenhofer and Porbus realize only later that neither one of them actually knows Poussin. The conversation begins to ensue about Porbus’s latest work, a painting of the Virgin Mary, during which Frenhofer criticizes the painting for lacking life. When Poussin objects, the older artists grow aware of his anonymity and challenge him to prove his right to be in the studio with them by producing a sketch. This Poussin does in a manner that sustains their interest in him, and he is officially welcomed

59 Serres, “Noise,” 48.

60 Ibid.

into the context. To illustrate his own emphasis on life and movement, Frenhofer then applies his own artistic touch of color to Porbus's Virgin Mary, making the figure appear alive as he had insisted he could. Later on, they discuss a painting by Frenhofer's own master, whose name is Mabuse, and who is absent from their meeting. It is a painting of Adam. Frenhofer makes the same critique of his master's painting as well, that it is lacking liveliness. Then he begins to talk about a painting by himself that he had been working on for ten years, and that no one had so far seen. Like Porbus's own painting, it is an attempt at capturing perfect beauty in paint—beauty that is engendered without ever having been received in an act of conception: a Mary that will have been without ever actually being “here” or “anywhere”—i.e., beauty as pure nakedness, beauty in the temporal form of a future past that could only be real if it were capable of bracketing out the presence in a manner capable of preserving its actuality indefinitely, toward both past and future—in other words, a present tense that never actually happens. Pure nakedness, the painters well know, cannot possibly be embodied by a model that poses for a painting.

Serres now stresses the generational setup of Balzac's story, while “anchoring” all protagonists in one shared spatiotemporal “climate”: “Balzac depicts three painters, contemporaries and successors. It took place in bad times when stubborn men without any hope were keepers of the sacred flame, men who were certain that they had to keep it alive,” Serres tells us.⁶¹ Hence the continuity between the generations is established by “a secret flame”—all the protagonists knew that “they had to keep it alive.”⁶² Poussin is the young one, Porbus the adult one, Frenhofer the old one, and Mabuse, Frenhofer's master, is absent. All of them are aspiring to achieve one and the same goal in their work, namely “to keep the sacred flame” without knowing how.⁶³ All of them find inspiration in their models, who are also their partners in life. Poussin lives with Gillette, “a perfect beauty. Go to Greece or Turkey, go anywhere, you won't find her match.”⁶⁴ Porbus, the adult, lives with Marie, “an image that is alive in spots and not in others. A mixed set.”⁶⁵ Frenhofer, the old one, lives with Catherine Lescault, “a courtesan, that beautiful noiseuse who does not exist.”⁶⁶ All strive to keep the flame in taking their loved ones as a model for their painting. But: “The tree's direction is one way for men, as the brush loses power as time goes by. For women, it is the other way as beauty wins its calm presence as time goes by. Time goes one way for the maker [*facteur*], the other way for the model. Nicolas,

61 Ibid., 48.
62 Ibid.
63 Ibid.
64 Ibid., 49.
65 Ibid., 49.
66 Ibid.

while drawing, lives next to being itself, the old man, the creator, has lost it. Porbus is in the middle, uneasy, undecided, floating around. His picture fluctuates and doubts, it passes the river of time.”⁶⁷ After this depiction, Serres stops and begins anew. “Let us try to forget the simplistic cascade in which what he makes visible in turn makes visible a picture that in turn makes visible what ...” Serres invites his readers.⁶⁸ What cascade?

The three men follow each other, according to the order of Mabuse, just as priests are consecrated time after time, according to the order of Melchizedek. The three painters follow each other, according to the order of representation, the proper name of the dead man cannot fool us. All three have turned around to see their own pictures while, naked and forgotten, beauty cries behind them. As for the three women, they follow each other according to the order of being. Not according to the order of appearance but according to the scale of being.⁶⁹

So how to begin anew? How to mobilize one's doubt, strength to live up to one's commitment that one needs to achieve (keep the sacred flame) without knowing how? “The tree of life comes out of the picture, just as the tree of representations, obviously, goes into it. Why these two times, these two directions, these two ladders, these two trees, do they form a cross? Is this a very old, very absurd way of thinking?”⁷⁰ The story that Serres sets out to tell, and that he claims has happened in the seventeenth century, in the noisy quarrels of that time—while at the same time being a story that did not happen, and even more that could never have happened—introduces a manner of narration, of storytelling, that can do without these two times. It is a story of time in generational terms that does not mold the tree of life, iconically, into the form of a cross. In the picture, according to Serres, the tree of life and the tree of representations leave traces of an encounter. Traces in which, literally, *nothing* can be seen, because *nothing* is being depicted—“But sooner or later he'll notice that there's nothing on his canvas!” Poussin will comment when glancing at Frenhofer's completed masterpiece in the end of Balzac's story.⁷¹ And Frenhofer himself will despair: “I'm an imbecile then, a madman with neither talent nor ability. [...] I've created nothing!”⁷² Nothingness cannot possibly be mastered according to Balzac's story, hence Frenhofer cannot possibly identify with his masterpiece by seeing in it the completion he has achieved. Instead, he views it as a failure, destroys it together with his entire oeuvre, and dies that same night.

67 Ibid.
68 Ibid., 50.
69 Ibid., 49.
70 Ibid., 50.
71 Balzac, “The Unknown Masterpiece.”
72 Ibid.

By suggesting to take this “nothing-at-all” in a literal manner, do I not, in my reading of Serres, positivize what needs to be negated, for the sake of any ethics—if I may say so, a practice of keeping the sacred flame—that might once have been? The ethics we are looking for would have to be formulated in a strange tense that conjugates a kind of mightiness that *will once have been* without ever actually having been, as I specified earlier on. That is, an ethics, a form of life, or rather: the temporal mode of a form of life that cannot possibly be inferred from something that actually did happen. Are we not asking, thereby, for a practice that is, oddly, disembodied? In this peculiar story Serres narrates, which centers around a painting he claims capable of somehow capturing “a meeting between the real and the symbolic”⁷³—and this without being capable of actually depicting it—does Serres not lead us astray, leaving us behind somewhat lost, trying to grasp an empty center, dangerous and unsettling like the inner eye of a tornado, an empty center that swallows up and noisily distributes what appears to have been relatively peacefully at rest? Is it not a particularly violent destruction that I am trying to contemplate here? Thinking along these lines, we would be forgetting that this painting at stake, just as its painter—*le chef-d’œuvre inconnu*, the unknown masterpiece, and its fictional master (Frenhofer is the only character in the story that is entirely invented by Balzac)—exists only as a formulation that is fictional. Is fiction then that strange locus in quo that is capable of hosting as its “cases” formulations in that strange tense that conjugates a kind of mightiness that *will once have been without ever actually having been*? In other words, what would it mean to say that the character of fiction does not apply to mightiness itself—thereby distinguishing fictional mightiness as false pretense, as fake at best and a crime at worst, because of its impotence due to its character as invention, against a kind of nonsymbolic mightiness that must count as “real” and therefore “true” and powerful—but to the temporal tense of a symbolic mightiness in which the fake actually exerts real power?

One cannot deny a sequential order of time, Serres seems to be saying, by foregrounding the generational setup of Balzac’s story. But its sequentiality does not follow directions: “The tree of life comes out of the picture just as the tree of representation goes into it.”⁷⁴ Serres seems to maintain that we would be capable of rethinking time in neither a continuous nor fragmented, nor linearly progressing manner if only we begin to value (discern, estimate, rate), in our stories (narrations), a life of the fictional—of that which is invented or imagined in the mind, just as we value the liveliness of all things real. Balzac witnessed a meeting between the real and the symbolic, and he did so *in the story*. If we read this “in the story” as a *fictional locative*, then it will be a locative that is not empty of meaning but rather

⁷³ Serres, “Noise,” 48.

⁷⁴ *Ibid.*, 50.

one that can sustain any meaning. It would be a *cryptographic locative*, that is, because it is symbolic—empty neither in the sense of demarcating, nihilistically, the reality of a non-place, nor in the sense of a determinate and defined positively locatable location, a place of the negative. Such “emptiness,” I want to suggest, is the emptiness of a cryptological code that is pure capacity—relative strictly to the meaningfulness with which one is capable of endowing the symbolic any-structure of the meaning transmitted. A phonetic alphabet, like the Roman one, for example, can be viewed as such a code: it comprehends a finite stock of elements that are ordered in a particular sequentiality, the characters expressed by letters, and in terms of these letters all words that can *in principle* be uttered—meaningful once, now, in the future, or even never—can be expressed. There is a certain materiality to the utterances of articulated speech, and a distinction between literal and figurative speech, truth and fiction, argument and rhetoric, can be applied to them only retrospectively. In that sense, the formal character of the alphabet is that of a code system, just as the diverse and so-called probabilistic alphabets with which engineers are computing today, or the many phonetic alphabets that preceded the Greek one (which is usually referred to as “the first” phonetic alphabet in history).⁷⁵ My claim then is that the cryptographic locative can express “nothingness” in “literal” manner, because the letters of the alphabets it uses are the atoms of a materiality of articulated speech—a materiality that presents itself in no form, a materiality that is furious, unorganized, yet not inarticulate, a materiality that Serres calls “noise.”⁷⁶ A cryptographic locative cannot pos-

⁷⁵ There have been “phonetic alphabets”—meaning scripts that do not provide inventories of things with the letter series they express, but rather a metrical system to note how one speaks about the things one strives to inventorize—as early as 2000 BCE. However, most of them wrote only in consonants, producing a kind of “extract-text” that can be read by many cultures even if the way they articulate and pronounce the read sequences of letters was so different that the people speaking it could not understand each other in speech—based on such scripts, however, they could in writing. For the political implications of different scripts, and the different literacies they produced, see Harold Innis, *Empire and Communication* (Toronto: Dundurn Press, 2007 [1950]). Still today, for example, the Arabic language struggles with its tradition as a pure consonant script. Mohammad’s prophecy has been recorded in the Koran in a consonant script, and already by the early Renaissance there were many different ways of reading the prophecy—giving rise to different Islamic cultures. See the article by Suleiman Mourad and Perry Anderson, “Rätsel des Buches: Zur Geschichte des Korans und der historischen Dynamik des Islams,” trans. Florian Wolfrum, *Lettre International* 106 (Fall 2014): 118ff. Greek phonetic script introduced for the first time the means to write down explicitly a manner of speaking (vocalization) that has not actually been spoken by any one people in particular, but that is a script applying vocals together with consonants, and that has been invented artificially in order to establish a common tongue that can be learned easily by all parties contracted in networks of trade relations in the Mediterranean area. With regard to the Greek vocal alphabet, see Innis, *Empire and Communications*, and Eric Havelock, *Preface to Plato* (Cambridge, MA: Harvard University Press, 1982 [1963]) for a discussion of how this prehistoric genealogy of the phonetic alphabet relates to the “mysterious” leap into new levels of abstraction produced and witnessed by the Greek culture in antiquity.

⁷⁶ See Michel Serres, *The Birth of Physics*, trans. Jack Hawkes (Manchester: Clinamen Press, 2001 [1977]).

sibly be working within a scheme of representation because it calls for an *infinite* base, which, following Serres, we can learn to call “ichnography.” He seems to be telling us that it is the infinite base of an ichnography that is being narrated in fiction, and that constitutes fiction as a locus in quo where the real and the symbolic can meet. Let us now pursue this line with greater care.

The term “fiction” comes from the Latin *fictionem*, “a fashioning or feigning.” It is a noun of action from the past participle stem of *figere*, “to shape, form, devise, feign,” originally “to knead, form out of clay,” from PIE **dheigh-*, “to build, form, knead,” and also from the Old English source in *dag*, “dough.”⁷⁷ Since the late sixteenth century, fiction also demarcates “prose works of the imagination” in distinction to dramatic works of the imagination. From that same time onward, there is also a legal sense of the word, according to which law was characterized as “fiction.”⁷⁸ Related words include the Latin *factilis*, “made of clay, earthen,” as well as *factor*, “molder, sculptor,” as well as (ascribed to Ulysses) “master of deceit,” drawn from *factum*, “a deception, falsehood, fiction.” What strikingly distinguishes the notion of “fiction” from that of “illusion” is, as we can see in this genealogy of the term, that it was used in a sense that could perhaps be characterized as “uncritical”: different from a fiction, an illusion makes plain that it operates within the realm of the apparent, and hence presumes, for its very identity, a certain distance and mediacy related to the faculty of understanding, and this faculty’s capacity for judgment. Such mediacy is inherently problematic in relation to fiction, because fiction does not operate within a representational framework. This is exactly the point Serres makes so strongly in his narrative mode of “storytelling.” Let us carefully and slowly try to understand how this might work.

The masterpiece painting around which the plot in our story unfolds is Fernhofer’s painting of his imaginary mistress, Catherine Lescault, also called “the beautiful noiseuse.” This painting “is not a picture,” Serres tells us, “it is the noise of beauty, the nude multiple, the abundant sea, from which is born, or isn’t born, it all depends, the beautiful Aphrodite.”⁷⁹ Beauty, in its pure nakedness, is neither to be seen in a woman, a female God, nor in a feminized reification of nature that would characterize physics in its objectivity. Such beauty can only be imagined *in status nascendi*, born from the foam of a noisy sea, as the fictional impersonation of the anadyomene: “We always see Venus without the sea or the sea without Venus, we never see physics arising, anadyomene, from metaphysics.”⁸⁰ The schema of associating an active principle, form, or intellect that imposes itself upon receptive and nurturing nature, is

77 *Online Etymology Dictionary*, s.v. “fiction (n.),” http://www.etymonline.com/index.php?term=fiction&allowed_in_frame=0.

78 *Ibid.*

79 Serres, “Noise,” 54.

80 *Ibid.*

thwarted in Serres’s account. Considering the fictional as distinct from the illusionary, he must not see in form a schema or outline of the true that needs to be substantiated—filled with materiality—in order to constitute knowledge. Rather, form itself is a figuration of the unknown rising as the anadyomene: form is “information that is phenomenal,”⁸¹ and it “arises from chaos-white noise.”⁸² He continues: “What is knowable and what is known are born of that unknown.”⁸³ Serres refers to “that unknown,” the anadyomene, also as “chaos-white noise”—with that, he separates that unknown from an unknown that would merely host the impossible as the negative of the possible, or the improbable as the negative of the probable. In the unknown, Serres considers that “there is nothing to know.”⁸⁴

I want to suggest that (1) if we consider Serres’s understanding of a story as the locus where the real and the symbolic can meet, then (2) we can reason and make sense of this “nothing” as something neither positive nor negative, but (3) as the any-capacity proper to an alphabet that constitutes a cipher. What I would like to read into and extract from Serres’s text is that the question of “mediacy” can be approached in a different manner once we can develop a less counterintuitive and less disturbing idea of (1) such “nothingness” that is, essentially “anythingness”; (2) its communicability into “somethingness” through encryption; and (3) the “originality” of the “secret somethings” that are being sourced from such a symbolic nature as “nothingness/anythingness.” We can develop such an idea from looking at how mathematics deals with the zero. My assumption thereby is that the zero in mathematics entails all the problems we have encountered with regard to the nothingness that Fernhofer has painted in Balzac’s story, that nothingness of which Serres, in his reading of Balzac’s story, insists (against Balzac) marks the completion of the unknown masterwork, not its failure. So what is a mathematical “cipher”? The notion designates, on the one hand, the zero in mathematics, and, on the other, it is a generic name for numerical figures (as *Ziffer* is in German).

Let’s begin with how we refer to the zero. Of course we have an encoding for it with our symbolic notions of numbers. This may sound rather unspectacular, but we need to consider more precisely what it entails. We have in mathematics, or more precisely in algebra alone, an intermediate level of notational code and ciphering between “notational signs” and what they “indicate.” This intermediate level is introduced because algebra operates in abstract symmetries (equations): algebra is the art of rendering what terms a formula (an equation with unknowns) is being expressed in into the mappings of possible solutions for the

81 *Ibid.*

82 *Ibid.*

83 *Ibid.*

84 *Ibid.*, 48.

unknowns. From a mathematical point of view, the mappings rendered by the articulation of a formula (an equation) are varying expressions of one and the same thing—while that “one and the same thing” itself remains “absent.” Neither of the articulable expressions of the terms (articulated in how the terms of the equation are factorized, partitioned) is ever capable of expressing explicitly and exhaustively all at once whatever it may be that is being articulated in a formula (the “identity” expressed in an equation). There is a constitutive level of mediateness involved, which never lets the mathematician forget that what one seeks to express by stating its identity in terms of a formula must be considered as being of a vaster extension than any one discretion of its symbolic expressions can ever be. In other words: a function is always derived from an equation that has been rendered solvable. We can conceive of this “rendering solvable” as “mediation” that is peculiar to the relation of algebraic “idempotency” and its capacity to express “identity” *inversely*. And we can conceive of any version of algebraically articulated “identity” as the symbolic establishment of a tautological relation in a manner that is not “absurd”—precisely because of this tautological character that expresses one and the same thing differently. Like the allegorical elephant in the room full of blind people eagerly describing to each other what they perceive to be “present,” the algebraically articulated “identity” becomes more and more distinguished and rich in qualities as the quarrel of “getting it right” goes on. Every claim, if it is to persuade, has to establish a code that can be shared.

Now in what sense can we say that every code is constituted by a “cipher”? The establishment of a code requires a projection space in which a structure is doubled up and mirrored around a neutral point, such that a fixed order of reference can be assigned between the doubled-up structures. Cipher is another word for this neutral point, which we commonly call the zero. A code is always participating in the game of encryption. An easy example to illustrate the cryptographic or cryptological relation between a code and a cipher are codes for encrypting texts.⁸⁵ One takes a set of finite and ordered elements, in this case the alphabet, duplicates it, and mixes up the order of the elements in the duplicate version. Perhaps one uses another notation system like numbers or figures, or perhaps one may also decide to introduce further elements to the duplicate version that are not contained in the duplicated one in order to raise the difficulty of “breaking the code”—that is, in figuring out the structure of the transformations applied between the two. The establishment of a code depends upon a place-value grid or frame within which it is possible to locate and correlate the positions occupied by values. This allows for remaining undecided with regard to

85 It depends on how we treat the relation, whether primarily analytically as in cryptology, or primarily synthetically as in cryptography.

the substance of the value, or algebraically, the one partition scheme that determines judgments (prime parts, *Ur-teile*). Thus considered, “values” have an essentially cryptic character—one that can only be clarified by giving “figure” and associating a “face” to their cryptic character as we learn to “enfamiliarize” and “decipher” it. I put decipher in quotation marks to highlight that here (as in the allegorical space with the elephant and the blind people), we are speaking about a mode of deciphering that has to invent the code that makes that very decipherment possible—a kind of deciphering that does not hack or intrude into a “secret,” but one that renders communicable what we might perhaps best call “an arcane regularity”—a regularity that remains arcane, even while being rendered communicable, sharable, public.⁸⁶

As one comes to “master” such regularity, one literally “masters nothing,” in a manner in which “nothingness” must not be addressed in either positive or negative terms. We have to understand the secret at stake in a sense that is chemico-physical, as a secretion, from the Latin *secretionem*, “a dividing, separation, a setting apart.”⁸⁷ In other words, the secret is not something initially clear, pure, or plain, whose possibility of discretion has been rendered occult, difficult, exclusive. What Serres suggests in his reading of “The Unknown Masterpiece” as the beautiful querulent is that such assumed purity, clarity, or plainness is, in fact, initially noisy—a mixture of heterogeneous factors, factoring in something that can never be known exhaustively and as a whole. A secret in that sense turns into a well or source that is, essentially, public: no one can control all the articulations of how the secret circulates that can be “sourced,” set apart and rendered communicable, by learning to master its well—which, for Serres, is nothingness as primary noisiness.⁸⁸

With this, we come close to the second genealogical lineage of the notion of the cipher, one which departs from and builds upon the first one (cipher as zero): in number theory, the cipher not only stands for the zero, but also for the numerical figures as they are expressed in the terms of a common base like the hexadecimal number system, or today the decimal number system. Such positional systems are organized in what is today called logarithmic tables—a term introduced by John Napier in the seventeenth century, expressing what he called “ratio-numbers,” or numbers put in

86 See my article “Arché, Archanum, Articulation: The Universal and Its Characteristics,” in Bühlmann and Hovestadt, *Domesticating Symbols*, 112–77.

87 *Online Etymology Dictionary*, s.v. “secretion (n.),” http://www.etymonline.com/index.php?term=secretion&allowed_in_frame=0.

88 This manner of thinking strikes me as so interesting because it suggests the counterintuitive or at least apparently paradoxical idea that there might be a kind of mastership that, through privacy, produces and renders distributable public goods—commons—rather than accumulating them and claiming them as private property, on the grounds that one (more so, or differently so) *masters* it. See also my article “Articulating a Thing Entirely in Its Own Terms or What Can We Understand by the Notion of Engendering?,” in *EigenArchitecture: Computability as Literacy*, ed. Ludger Hovestadt and Vera Bühlmann (Vienna: Ambra, 2013), 69–127.

proportionate notation, from *logos*, proportion, and *arithmos*, number. The decision with regard to which base the proportionality is set up characterizes the notion of numbers as a particular code. It is within algebraic number theory that the positional logic of such notational systems itself is being thematized, in a manner that in the nineteenth century usually took the form of placing numbers on one infinite line—the so-called number continuum. Richard Dedekind and Giuseppe Peano have introduced a general procedure of how to identify numerical domains as number classes embedded and nested both within each other as well as within that continuum (the rationals, reals, integers, etc.). The application of this procedure (called the Dedekind Cut) requires further and further levels of *relative* abstraction attributed to the algebraic symbols in whose bonds or relations numbers are now being expressed—numerical values are here subjected to symbols used as jokers, as placeholders with a “naked” or “pure” capacity to render countable an any-meaning that might not even yet be articulated. Algebraic symbols are at work in identifying the positional logics of these purely symbolic domains, up to the situation we have today where number theory is understood by many as the very object of cryptology/cryptography/cryptoanalysis rather than as part of natural philosophy, as Frege, Russell, Whitehead, Husserl, and others have regarded the advent of Universal Algebra.⁸⁹ Today, on an ordinary basis (in all electronic things and infrastructures) there are entirely abstract numerical bodies at work that are called “fields” in English,⁹⁰ as well as a great diversity of abstract constructs that build upon them—with beautiful names such as “rings,” “lattices,” “sheafs,” and so on. In the perspective outlined here, these “names” of “algebraic things” (symbolic “things”) name secretions of nothingness—secrets rendered communicable *because they are extracted from the inverse* of what Western philosophy has been centering around for more than two millennia, namely the fantastic inception of the idea of universal, eternal, enduring, and persisting *essentiality*—that is, the notion of *universal substance*.⁹¹

89 Whitehead introduced this term to express that from the point of view of mathematics there is a multiplicity of systems of symbolic reasoning that cannot be decided in terms of supremacy on the basis of mathematical consistency criteria alone. See Alfred North Whitehead, *Treatise on Universal Algebra with Applications* (Cambridge: Cambridge University Press, 1910).

90 The term “field” is a rather unfortunate and, arguably, even misleading translation from the German term *Zahlenkörper*, with which Dedekind introduced these symbolic numbers. The translation is unfortunate because the notion of the field suggests that no local organization differentiates one against another; fields are subject to the uniform forces of electromagnetism where all “locality” is but a function to this uniformness. The term “body of numbers” on the other hand puts all its emphasis on a certain “autonomy” or “self-maintenance” of such a local organicity.

91 Especially interesting contemporary studies in relation to this: François Laruelle, *Principles of Non-Philosophy*, trans. Anthony Paul Smith (London: Bloomsbury, 2014); as well as Jean Luc Nancy’s interest in a notion of “exscription,” e.g. in “Exscription,” in *The Birth to Presence*, trans. Brian Holmes et al. (Stanford, CA: Stanford University Press, 1993), 319–40; and “Corpus,” in *ibid.*, 189–207.

If number theory could give us an inverse of universal substance instead of its axiomatic elements, as Frege, Russell, Whitehead, Husserl, and others were trying to establish⁹²—would that not help in coming to terms with those developments in nineteenth- and twentieth-century science that so trouble modernity’s grand idea of a Natural Philosophy? I am referring of course to all the issues already discussed in relation to the notion of “mediacy” and “media”: (1) to the centrality of “radioactivity” in physics, and its counterintuitive understanding of a quasi-materiality of invisible light, or more precisely, the interactivity among particles in their emission and exchange of light that contains energy; (2) the therewith associated “birth and death” of countless galaxies in an expanding Universe in astrophysics; (3) the depiction and technical control of such radiating activity via technical images called “spectra”; and (4) the spectrum-based, quantum-physic “substrate” of our contemporary form of technics in communication and computation.⁹³ Let us return to the plot of the story. We have already seen that Frenhofer’s masterpiece is characterized as depicting nothing-at-all. More concretely now, what does it in fact depict? “‘The old fraud’s pulling our leg,’ Poussin murmured, returning to face the so-called painting. ‘All I see are colors daubed one on top of the other and contained by a mass of strange lines forming a wall of paint.’ ‘We must be missing something,’ Porbus insisted.”⁹⁴ The “secret” is not something initially clear, pure, or plain, whose possibility of discretion has been rendered occult, difficult, and exclusive, as Porbus and Poussin consider (“‘There’s a woman under there,’ Porbus cried”).⁹⁵ What Serres suggests in his reading of “The Unknown Masterpiece” is that such assumed purity, clarity, or plainness is, in fact, initially “noisy”—a mixture of heterogeneous factors, factoring in something that can never be known as whole. But what, then, did Frenhofer depict? How could he possibly paint noise as noise? By producing a “fake” painting, a painting that lacks an original. “The Unknown Masterwork is a fake. It happens in a placeless space, is signed by a nameless author, is told in a timeless time. No, there is nothing beneath, not even a woman.”⁹⁶ And Serres continues to spell out how he thinks of the unknown that he understands Frenhofer to

92 See the lesser-known and early writings of Edmund Husserl in his dissertation *Beiträge zur Theorie der Variationsrechnung* (1882) as well as his habilitation *Über den Begriff der Zahl: Psychologische Analysen* (1887); Gottlob Frege, *Die Grundlagen der Arithmetik: Eine logisch mathematische Untersuchung über den Begriff der Zahl* (1884); Bertrand Russell’s dissertation *An Essay on the Foundations of Geometry* (1897); Alfred North Whitehead’s *A Treatise on Universal Algebra with Applications* (1898); and Ernst Cassirer’s *Descartes’ Kritik der mathematischen und naturwissenschaftlichen Erkenntnis* (1899).

93 As a great overview and introduction into these topics for the layman, I suggest referring to the respective articles in Serres and Farouki, *Le trésor*.

94 Balzac, “The Unknown Masterpiece.”

95 *Ibid.*

96 Serres, “Noise,” 48.

have painted: “If the masterwork is improbable or impossible it is not unknown and there is nothing to know.”⁹⁷

But if Serres’s reading maintains that this very masterpiece is indeed a masterpiece, because it depicts beauty stripped from any model that could “wear” it, instantiate or represent it, beauty in pure nakedness, beauty as unknown beauty, then these characterizations counter his argument, or don’t they? If the masterpiece is declared impossible or improbable, then it would not be unknown—because the impossible is merely the negation of the possible, and the improbable is the negation of the probable. Both are statements uttered from the stance of the always already initiated, for whom there can be no genuine secret in the chemico-physical sense introduced above in which there can be nothing to know. For according to this sense of the unknown as a genuine secret(ion), there must always and still be something new to know, as Serres adds to his critique on impossibility and improbability as frames in which to refer to the unknown that Frenhofer has painted. “Or else: is there still something new to know now?” he asks.⁹⁸ But if neither a model, nor a frame in whose terms we might refer to the kind of Unknown Serres seems to be talking about, then what? Are we not at a hopeless loss with such purport?

“The picture that is discovered at the end of the story is the ichnography,” we are told by Serres—the *ichnography*, with a determinate article. But how can Serres’s proposed resolution, that of ichnography, mean something different from a frame of reference? Let us attend to the full passage that Serres continues with: “The picture that is discovered at the end of the story is the ichnography. The beautiful noiseuse is not a picture, is not a representation, is not a work, it is the fount, the well, the black box, that includes, implies, surrounds, that is to say buries, all profiles, all appearances, all representations, the work itself.”⁹⁹

The term “ichnography” is usually rendered into English as “ground-work,” or “ground plan,” and into German as *Grundriss*. It is a term that plays a crucial role in architectural theory ever since the first theoretical treatises on architecture (that we know of) had been composed by Vitruvius in the first century BCE. It never comes alone, but always in association with two complementing terms: those of *orthography* and *scenography*. All three are terms that refer to particular kinds of draftings that help the architect to learn, develop, and refine building as a practice (or even as an art). In technical terms, the orthography means plans that elevate the schemata of the ground plan into upright position (depicting the voluminosity of the building in profile), and scenography means plans of the multiple views on a building in profile. The German terms are respectively *Grundriss*, *Aufriss*, and *Seitenriss*. I mention

97 Ibid., 48.

98 Ibid.

99 Ibid., 54.

this because the German terms, unlike the English ones, hold on to a distinction that keeps the practice of the draftsman, and hence the timelessness of geometry, separate from the dynamics that unfold in time as is inherent to the notion of the “plan.” This is an important distinction, because it helps to understand that there has been a dramatic element in architecture ever since it has been theorized: scenography introduces storytelling and a quasi-rhetorical aspect of expression to building as a practice. There is a tension at work within architecture that is not unlike the one in philosophy between rhetoric and argumentation, whose vectors rotate around that big idea called Truth. Is there in architecture then also a kind of “truth” at stake? It surely couldn’t be the same as in philosophy, it seems. But then, on the other hand, from the first treatises on architecture, it was all about a building’s “adequateness” or “proportionality”—a temple’s adequateness to the gods that are being worshiped; a villa’s adequateness to the social and political power of the master whose *oikos* (property) it is to accommodate; an aqueduct’s adequateness to its purpose (transporting water); and perhaps the most immense “task” to be fulfilled by architecture, namely to match a city’s adequateness in conforming to “the” order of “the” cosmos. The three different kinds of drafting, serving the architect to refine her ability as an architect, also introduce thereby a *contractual* dimension into the power relations that organized the practice of “building in adequate and proportionate” manner. They each come with different kinds of categories that all allow to differentiate, discrete, compare, and argue about the “worth” of particular buildings via recourse to the work of the architect as draftsman. Thus, without necessarily being very familiar with the corpus of architectural theory, we can easily imagine the disputes about what exactly was meant by *ichnography*, *orthography*, and *scenography* (as well as the relations between them that could be derived from these attributed meanings together with the network of consecutiveness that results from those relations). It doesn’t seem to be overstressing the point to say that these three terms capture the invariant “topic” of architectural theory. Architectural theory encrypts and encodes its own “identity” in the terms of these “categories”—not at all unlike metaphysics, which has been doing the same with the philosophical categories.¹⁰⁰

In Serres’s account, the Unknown Masterpiece is “not a picture, is not a representation, is not a work, it is the fount, the well, the black box, that includes, implies, surrounds, that is to say buries, all profiles, all appearances, all representations, the work itself”—it is “the ichnography,” the crypt of the arcane source of all secrets that can be articulated. This is what Poussin and Porbus don’t expect to see in the painting. They “run

100 This arguably holds at least until the twentieth century, with Gottfried Semper and his notion of “style” in architecture perhaps as a (provisionally?) last rearticulation of this conceptual legacy in an attempted systematic manner.

toward the canvas, move away, bend over, right and left, up and down, they look for the habitual story-line, the usual scenography. And they stand so as to see an oblique profile. As if by chance, they shall have a spot where a straightform will appear. Scenography, orthography. And they look, as is their wont, for a space where there is a phenomenon, a space and an incarnation, a cell and knowledge. A representation. And thus, they do not see the ichnography.¹⁰¹

Because there is no habitual story line depicted they too look for something that lies buried—“‘There’s a woman under there,’ Porbus cried”¹⁰²—but they look for it as if there would have to be “a space where there is a phenomenon, a space and an incarnation, a cell and knowledge.”¹⁰³ But Frenhofer’s painting “is not a picture, is not a representation, is not a work,” Serres tells us, “it is the fount, the well, the black box, that includes, implies, surrounds, that is to say buries, all profiles, all appearances, all representations, the work itself.” The ichnography is the crypt of the arcane source of all that can “secrete” only insofar as it must be *deciphered* from all profiles and perspectives—there is no continuous mapping from orthography and scenography to ichnography. “Once again, what is this ichnography? It is the set of possible profiles, the totality of all the horizons. Ichnography is what is possible, or knowable or producible, it is the fount of phenomena. It is the complete chain of the metamorphoses of the marine god Proteus, it is Proteus himself.”¹⁰⁴

With his insistence that “the ichnography” be “the totality of all the horizons,” where no continuous mapping from the phenomena (profile and perspective, orthography and scenography) to the ground (foundation or reason, ichnography) is possible, Serres relates Balzac to Leibniz. “Balzac saw the ichnography. I think he figured out that he had seen it. Since he signed his name to it.”¹⁰⁵ I will come back to this role of the signature in a moment. In contrast to Balzac, Serres continues, “Leibniz never saw the ichnography. He undoubtedly demonstrated that it was invisible. He was aware of it, he demonstrated that it is unknowable.”¹⁰⁶ And furthermore: “Leibniz drowns everything in the differential and under the innumerable thicknesses of successive integrations. The mechanism is admirable. No one ever went as far in rational mastery, even into the smallest nooks and crannies. The straight direction of reason that must turn away from this chaos is the ascent of these scallar orders. The path is ahead, it is infinite, the perfect geometrizing remains inaccessible. It is divine, it is invisible.”¹⁰⁷ Porbus and Poussin

101 Ibid.

102 Balzac, “The Unknown Masterpiece.”

103 Serres, “Noise,” 54.

104 Ibid.

105 Ibid.

106 Ibid.

107 Ibid., 55.

followed the path that Leibniz had thought infinite, Serres maintains. “Having broken in, they contemplate the divine work of geometry without understanding.” Why? “Because they expected another picture, one that would have been like an extrapolation, part of the chain of forms. The last, the first representation, why couldn’t it be a representation too?”¹⁰⁸ But “ichnography is not harmony, it is noise itself.”¹⁰⁹ Leibniz’s system turns around “like an iceberg” in Serres’s purport of an unknown that is “the beautiful noiseuse [...] beauty denuded of her appearances, of the dress of representation.”¹¹⁰ Like Leibniz, Serres too is after an infinite base. Yet it “cannot be structured by rigorous and lucid reason. It is immersed in white noise, in the mottled clamor of the confused.”¹¹¹ The totality of the rational is not itself rational, Serres maintains.¹¹² And further, the culminating phrase: “Balzac paints the vision that is the opposite of divine architecture.”¹¹³

THE SIGNATURE OF THE UNKNOWN MASTERPIECE

But once again, how shall such painting be possible? How can Serres claim that “Balzac saw it, knew it”?¹¹⁴ Indeed, how can he? “I can show that he saw it. I can really show that he figured out that he had known it: since he signed it.”¹¹⁵ We have to come back now to this crucial notion of “signature,” and the role it plays in relation to the architectonic dimension of a “contract” the architect enters as the “draftsman.” For it is this very dimension, the contract the architect enters, that secularizes the role of the architect in the precise sense of this word: the secular means “living in the temporality of the world, not belonging to a religious order.”¹¹⁶ The unknown as the fount of the possible that Serres purports allows the architect, as well as the geometer, to preserve, within the contract that is the contract of the draftsman, the possibility for disobedience. For Serres, the spectrum—the totality of all colors, the canvas of the successful completion of a masterpiece (in Serres’s understanding of mastership whose master is the subject of his novel humanism), is the element of geometry—it is metaphysics, and not physics. It is the crypt of physics, physics as encrypted reality of all that is “mediate.”

Geometrizing was the inaccessible object of metaphysics and still is. White noise is geometrizing. A field of inquiry thought closed is open. The noisy, anarchic, clamoring, mottled, striped,

108 Ibid., 56.

109 Ibid.

110 Ibid.

111 Ibid.

112 Ibid., 56.

113 Ibid.

114 Ibid., 55.

115 Ibid.

116 *Online Etymology Dictionary*, s.v. “secular (adj.),” http://www.etymonline.com/index.php?term=secular&allowed_in_frame=0.

streaked, variegated, mixed, crossed, piebald multiplicity is possibility itself. It is a set of possible things, it can be the set of possible things. It is not strength, it is the very opposite of power, but it is capacity. This noise is the opening. The Ancients were right to think chaos a gaping abyss. The multiple is open and from it is born nature always being born. We cannot foresee what will be born of it. We cannot know what is in it, here or there. No one knows, no one has ever known, no one will ever know how possibilities co-exist and how they co-exist with a possible relation. The set is criss-crossed with possible relations.¹¹⁷

Physics as encrypted reality of all that is “mediate” is physics as that which is computable. It is important to see that computable solutions—encrypted algebraic “identities”—do not stand for something, they are no *representation*. The articulation of a formula resolves the involved terms (their factorization) into mappings (functions) that can stand in for rather than stand for. It is true, they demarcate a case, because they are inferred from a generalization, but they do not demarcate a case by representing it; rather, they demarcate a case categorically, by depicting the syntax of a function according to whose rules we articulate the terms of an equation. My point is that we can think of their categorial demarcation of a case according to the grammatical case of the locative. They demarcate a case whose place is “nowhere”—but this “nowhere,” being a function to “somewhere,” is locative rather than representative. They stand in for the unknown parts and aspects of *that which has been articulated in a formula*—not unlike in language, where words stand in for whatever absent thing they may present to our minds when we depict the sense of words. These mappings can stand in for their own “original,” so to speak—that is, they can articulate “the original” as an unknown, as something not mastered, because they articulate “the original” in a tautological manner (in the form of an equation). This does not need to be seen as an absurdity. The mappings rendered by the articulation of a formula (an equation) are varying expressions of one and the same thing—while that “one and the same thing” remains absent. Neither one of the articulable expressions of the terms (articulated in how the terms of the equation are factorized, partitioned) is ever capable of expressing explicitly all that is to it at once. In other words: that which is being expressed is of a vaster extension than any one discretion of its possible symbolic expressions can ever be.

I shall explain what I mean. What is ichnography? What is this masterwork where the term “master” [*chef*] means less a unique and rare success than it does capital, stock, fount, I mean ichnography? Well, the Greek term *ichnos* means footprint. Moving

117 Serres, “Noise,” 56.

toward the canvas, they saw, in a corner of the canvas, a bit of a naked foot that arose from the chaos of colors, tones, and vague shadings, a kind of form-less fog; it was a delicious, living foot! They stood there in complete admiration in front of this fragment that had escaped from the unbelievable yet slow and progressive destruction. The foot appeared there like the torso of some Venus sculpted in marble from Paros, a Venus arising from out of the rubble of a city in flames. Here then is the signature with the very name of ichnography. The beautiful noiseuse is the flat projection.¹¹⁸

We can see from this how encrypted expressions always have a “transcendent” referent. Their power consists in “presenting” this transcendent referent symbolically while leaving it absent, just like words are capable of evoking something absent into presence. We can regard a cipher (an alphabet) as a symbolic body of a self-referential relation whose identity is being articulated, not represented—yet articulated in a split, linked, double, and parabolic manner, or more precisely, in a *symbolic* manner:¹¹⁹ neither form nor content, neither substance nor expression can be considered without reference to each other. They stabilize each other rather like planets in the galaxy of a solar system than by occupying schematic positions that would be thought of as existing prior to the birth of a particular solar system. The way that they refer to each other constitutes *natures* (in the plural) *of the universe*—the universe being, according to contemporary astrophysics, galaxies that differ in “kind” but not in “nature.” The astrochemical elements are considered by today’s science as the products of nucleosynthesis (the sun), and they are the main “referent” of whatever is organized in the technical “format” of a spectrum: what is being measured in an spectrum is the frequency rates of different types of light emitted by the sun (solar radiation).¹²⁰ All, in such a manner of thinking about the universe, is universal in character. And as such, Serres maintains, it is essentially *noisy*, or *in status nascendi*, anadyomene, as he says, physics born from metaphysics.¹²¹ Serres chose a mythical manner of formulating here, but there is a sense to what he is saying that is empirically supported, and we can decipher it from his insistence that geometry depicts white light. If as nonexperts we turn to a thesaurus of modern science, we can read that the white spectrum depicts all that moves at light speed; all that moves at light speed is of universal nature, in the sense that it is matter in its subparticle “state.”

118 Ibid., 55–56.

119 Literally “that which is thrown or cast together,” from assimilated form of *syn-*, “together” + *bole*, “a throwing, a casting, the stroke of a missile, bolt, beam,” from *bol-*, nominative stem of *ballein*, “to throw.” *Online Etymology Dictionary*, sv “symbol (n.),” http://www.etymonline.com/index.php?term=symbol&allowed_in_frame=0.

120 Cf. the respective articles in Serres and Farouki, *Le tréSOR*.

121 Serres, “Noise,” 54.

Isn't this what Serres calls "metaphysics"—that which "secretes" all that is sound and solid, as if out of the foam that is left behind by the furious clamor of incandescent and radiating matter (a sun)?

Let us recapitulate. The nature of the universe for Serres is secretive communication. Knowledge of the universe's nature consists in knowing how to keep its secretions secret, by building reduced models, crypts, that strive to duplicate it such that there can be communication—literally, "a sharing with, a making common"¹²²—of the bare beauty of universal nature through its models, the crypts. While modeling, building the crypt, is a kind of contractual architecture (a contract whose basis is the work of draftsmen) that proceeds in terms of symmetry (the object agreed upon in the terms of a contract is articulated algebraically, tautologically, and what is agreed upon is the inverse of the thus articulated object—as far as the parties can imagine it). The communication of such bare beauty that can only be modeled, on the other hand, must proceed in terms that are asymmetrical. This is why I have suggested that the practice of modeling is an act of comic dramatization (it has to deal with incommensurate magnitudes). The asymmetrical communication that models afford in turn affords the nature of the universe to be universal; that is, capable of descending and branching off in all sorts of directions. Such asymmetrical communication affords a universe that is expanding, but in no preset manner. It is important that keeping the secret in a crypt requires *asymmetrical* communication—or else there would have to be a Master Code(x), and those who serve its law would have to keep the channels of communication "safe" such that the Master Key could be shared solely among those initiated to that master code, while excluding whoever is not. Those who keep the secret then would not articulate Universal Nature, rather they would act as Universal Nature's representatives. Within Serres's narrative, instead of a Master Code(x), we have Code in whose terms the totality of all colors (a white spectrum) has been depicted. And this "code" is not a "codex." Rather than referring to the universal nature as (immediate) law, by duplicating the authority of universal nature in order to claim to be acting as its representative, the code at stake refers to universal nature only mediately, in the terms discernible from a spectrum. A code that has thus been depicted (as a spectrum, a painting of the ichnography) carries the signature of someone who serves that law by obeying it without submitting to it. Because the subject of such a signature has to be authenticated as one who obeys the (unknown) rules of things themselves. Someone like that acts disobediently, comically, toward all official representations.

¹²² From the Latin *communicationem* (nominative *communicatio*), noun of action from the past participle stem of *communicare*, "to share, divide out; communicate, impart, inform; join, unite, participate in," literally "to make common," from *communis*. *Online Etymology Dictionary*, s.v. "communication (n.)," http://www.etymonline.com/index.php?term=communication&allowed_in_frame=0.

But could there possibly exist such a signature, for its subject could not possibly be "one" or "whole," or could it? Wouldn't such asymmetrical communication require of the subject of such a signature to be of a split personality? A symbolic persona? An animal whose sex is to be universal?

If Serres dopes Balzac's story by introducing into it the notion of "ichnography," I want to dope Serres's story by introducing into it the notion of "a public key signature." The subject of such a signature indeed is a "split" subject, a "sexed" subject that desires and is never fully "whole"; it is, on the one hand, "anyone," and on the other hand it is "me." Let us see the principle behind it:

Public-key cryptography, also known as asymmetric cryptography, is a class of cryptographic algorithms which requires two separate keys, one of which is *secret* (or *private*) and one of which is *public*. Although different, the two parts of this key pair are mathematically linked. The public key is used to encrypt plaintext or to verify a digital signature; whereas the private key is used to decrypt ciphertext or to create a digital signature. The term "asymmetric" stems from the use of different keys to perform these opposite functions, each the inverse of the other—as contrasted with conventional ("symmetric") cryptography which relies on the same key to perform both.¹²³

With this, we could inverse our usual perspective, and consider that all "text" be, naturally so, ciphertext; encryption then doesn't obscure "plain text," rather plain text is what "secretes" from ciphertext.

Whatever message any private key can unlock from a message transmitted in ciphertext that is being transmitted distributively, and signed by a public key signature, would be strictly private. Such decipherments, then, appear to be plaintext—but the plainness of such a decipherment is but that of a model. The apparent plaintext that is contained in a ciphertext can only be articulated "authentically" by placing it in the locus where that peculiar mightiness of a possible future past (will have been) can be conjugated. We can refer to this locus by ascribing the practice of cryptography its own grammatical case, the case of a locative. The locus of a cryptographic locative is fictional, but that doesn't mean that it is an illusion. Quite differently, the locus addressable by the grammatical case of a cryptographic locative is the territoriality of the subject of Serres's novel humanism. Fictitiously, it builds a reduced model of universal knowledge, a model that is official not because it represents a lawful regularity (with lesser or greater authority) but rather because it serves the law by helping

¹²³ *Wikipedia*, s.v. "Public-key cryptography," http://en.wikipedia.org/wiki/Public-key_cryptography (last modified March 20, 2015). For an accessible introduction see the online lecture by Raymond Flood, "Public Key Cryptography: Secrecy in Public," held at Gersham College, London, November 11, 2013, online at https://www.youtube.com/watch?v=I3WS-5_IbnM.

to keep the secret that is the essence of universal knowledge. If the subject of a public-key signature is humanity at large, which guards its own nature and origin in the care with which it articulates the reduced models—the plaintexts, the private because deciphered “message”—of the ciphertext (universal nature as it manifests in all things existent and/or object to thought), then this subject never ceased to become what it already is. Let us recapitulate: what an alphabetic absolute and its ichnographic bases—the Crypts—would oblige a researcher to is modeling. But the relation models maintain to ideas is not one that would “realize” them. The authenticity of models does not depend on their capacity to represent. Rather, it depends on their obedience to the laws of things themselves, laws that can be deciphered only after they have been encrypted, laws whose statements are ultimately arcane. The obedience that makes a model authentic is an obedience that doesn’t develop strength and concentrate power; but it still produces capacity. It develops *the capacity to source phenomena*: “ichnography is what is possible, producible, knowable.”¹²⁴ This capacity is the very opposite of power and strength,¹²⁵ for it is capacity in dealing with sums and products of infinite terms. Every model generalizes. But if the Genus is a spectrum rather than a common denominator, then the discretion of “data” points must be rationalized and proportionalized discretely and fictitiously, and data “points” must be treated as many-valued indexes into numerous possible encryptions of the ichnography: the set of all possible profiles, the totality of all horizons. Every model informs a genus and is informed by a genus. How so? Because the genus is a sum of infinitely many terms (the genus as a spectrum) only because the model is universal in kind. With regard to the universality of its kinds, the genus can be considered real without ever being born or existent. A model’s kind is universal, self-sufficient, and hence also circular, but actively so: it strives to complete itself in comprehending all that it encompasses. Hence the model is not only kindred but also sexual (the symbolic “markedness” that endows the model with “inclinations” [desire and potency]). But it is the nature of this sexuality to be *modal*. The contingencies and necessities that determine a model can do so in *n* amount of manners—constrained only by the ichnography. In other words, as a model is conceived, the sex of its universal kind is omnipotent and undecided. It is an “organ” of the universal kind. The genus is what specifies models—what limits their strength in developing a capacity that is the very opposite of power. Every model generalizes. But if the researchers that raise them are committed to the alphabetic absolute, the models continue to maintain an intimate relation with the singularity of ideas regarding the great secret that is the universe’s omnipotent nature. These ideas are singular in how

124 Serres, “Noise,” 54.

125 Ibid., 56.

they demand to be encountered intimately, with pride and grace, in a play of seduction and conquer that never strives to possess the secretive sense—precisely because as a secret sense it is “private.” An encounter between the real and the symbolic, between the generic and the singular, is possible if the plots of stories are told in the cryptographic locative where no one can find their ways by being shown “the right path.” Our researcher committed to the alphabetic absolute *learns to masterfully not know* the meaning of this sense. This obliges her to assume:

- 1 That the design of models is always pre-specific and that it needs to focus on the witty and polite eloquence in which the model is articulated, such that it is then capable of *raising* the wealth of that in what the specific is richer than its genus: namely differences.
- 2 That the genus of universal kinds exists only in the conjugatable tense-ness proper to a fictional locus; the genus is the “temporalizer” of “real-time,” that is, “reality at the speed of light.”

This theme of the summation of infinite terms has indeed been central in the philosophical discussions that accompany the modernization of science; that is, the attempt to decouple science via a natural philosophy from its theological background. Let us now attend to this theme by tracing how it has been dramatized, and by attempting to foreground—at least in a tentative, indexical manner—some aspects of the larger sociopolitical implications at stake thereby.

THEME ONE, PLOT TWO:

THE SUMMATION OF INFINITE TERMS IN SERIES

SCIENCE, LIBERALIZATION, AND THE ABSOLUTE

I will base the tracing of this theme here by treating an article written by Eberhard Knobloch entitled “Beyond Cartesian Limits: Leibniz’s Passage from Algebraic to ‘Transcendental’ Mathematics” as a particular ciphertext.¹²⁶ At stake is not an evaluation of Knobloch’s own argument or interest pursued in his article; rather, the points he makes, and how he lines them up, is treated in my article in a thesaurus-like manner as indexes to larger themes. My “decipherment” of his “articulation” attempts to trace and communicate these larger themes. So what is at stake? “This article deals with Leibniz’s reception of Descartes’ ‘geometry,’” Knobloch tells us,¹²⁷ and he specifies his own point of departure for discussing this reception by exposing five notions he holds as fundamental for Leibnizian mathematics: “calculus, characteristic, art of invention, method, and freedom.”¹²⁸ Based on what these

126 Eberhard Knobloch, “Beyond Cartesian Limits: Leibniz’s Passage from Algebraic to ‘Transcendental’ Mathematics,” *Historia Mathematica* 33, no. 1 (February 2006): 113–31.

127 Ibid., 113.

128 Ibid.

notions entail, according to Knobloch, “Leibniz criticized Descartes’ restriction of geometry to objects that could be given in terms of algebraic (i.e., finite) equations.”¹²⁹ He explains: “The failure of algebra to solve equations of higher degree led Leibniz to develop linear algebra, and the failure of algebra to deal with transcendental problems led him to conceive of a science of the infinite. Hence Leibniz reconstructed the mathematical corpus, created new (transcendental) notions, and redefined known notions (equality, exactness, construction), thus establishing ‘a veritable complement of algebra for the transcendentals’ [here Knobloch cites Leibniz again]: infinite equations, i.e., infinite series, became inestimable tools of mathematical research.”¹³⁰

So let me suggest a model of how what these indexes draw together might be unpacked, and then begin with a kind of cryptographically inferential storytelling. The model is this: (1) at stake was the legitimization of working with infinite series in mathematics; (2) the grounds or reason with reference to which such “legitimization” was attempted by Leibniz was methodological, not cosmological (as was, arguably, the motive for Descartes’s trust in analytical geometry); (3) the point where this difference between Leibniz and Descartes manifested was the metaphysical question of how the identity of an object can be determined by mathematical description, hence, in their respective doctrines of substance: Descartes’s Dualism, and Leibniz’s Monism; (4) this difference, hence, is one that concerns the status of the subject (Descartes) or subjectivity (Leibniz) rather than one that would concern that status of the object (Descartes) or objectivity (Leibniz) only.

Let me begin with my storytelling then: if for Leibniz, the intelligible identity of an object can be discerned by infinitary means (his “infinite equations”), then thought itself is considered as actively creative—human thought, for Leibniz, is capable of participating in divine intellection because it is akin to that power. Descartes’s cogito, on the other hand, is not akin to divine intellect—it is its creature (that is why he insists on the discretion of intelligible identity by “finite equations”). For Descartes, Leibniz’s view is presumptuous and immoderate, but so is Descartes’s view to Leibniz (Leibniz is outraged that for Descartes, his own mind was the limit of science).¹³¹ I would like to suggest that the point of departure between the two positions can be found in the respective role they attribute to “the absolute”—the absolute understood as that for which there can be no reason, nothing causal, and hence that which is truly free. The term literally means “unrestricted; complete, perfect,” and also “not relative to something else,” from the Latin *absolutus*, the past participle of

¹²⁹ Ibid.

¹³⁰ Ibid.

¹³¹ Knobloch cites Leibniz: “Descartes’s mind was the limit of science” (ibid.).

absolvere, “to set free, make separate.”¹³² So when Knobloch specifies that Leibnizian mathematics was based on five fundamental notions including “freedom,” this is, arguably (and at least in this point), not something in which Leibniz differs much from Descartes. Only, freedom for Descartes still fell into the domain for which theological authority alone was responsible: an individual can be set free, *absolved*, as a member of the Christian community; this is why science, for him, shall have no dealings with the infinite.¹³³ This, for Leibniz, is not so straightforward. Between Descartes (born 1596) and Leibniz (born 1646), Europe underwent the immense torture of the Thirty Years’ War, which coincided with the spreading of disease and famine, during which 30 percent of its entire population died. On the one hand, and considered in a more abstract manner, the theological conflict between the Catholics and Protestants was responsible for this catastrophe. This conflict regarded, essentially, the character of Christian freedom and the authority of the clerics to absolve (set free) the members of the spiritual community. But considered in a more pragmatic manner, of course, this conflict was instrumentalized for the political project of rearranging the distribution of political power on the continent. Both Leibniz and Descartes were looking for political freedom through mathematical, rationalist science. Yet in the political landscape where Leibniz was making his living as a diplomat, he was in the service of whichever powerful monarch happened to value science, while Descartes had made his living as an esteemed and praised servant to the project of reformation. Where Descartes’s liberation consisted in linking up mathematics with physics, thereby exposing physics as inherently value-free, thus liberating nature from its status as a play toy of authorities with their competing theological claims on the cosmos—whose nature one supposedly studies in physics—Leibniz’s liberation was no smaller in scope, but it was oriented differently. He began to link up mathematics with theology, thereby liberating spiritual capacity for quickness from its disputed status between frivolity and diabolic possession as a play toy of authorities with their competing political ideas, thus suggesting that divine justice is manifest in nature.¹³⁴ It seems important to remember

¹³² *Online Etymology Dictionary*, s.v. “absolute (adj.),” http://www.etymonline.com/index.php?term=absolute&allowed_in_frame=0.

¹³³ See for example Jules Vuillemin, *Mathématiques et métaphysique chez Descartes* (Paris: Presses Universitaires de France, 1960). Significantly, this point is also what was later turned against Descartes’s philosophy by the Jesuits, who banned his writing by setting it on the index of prohibited books in 1663, on the accusation that his linkage between algebraic geometry and physics left not space for God in nature. See also Gábor Boros, *René Descartes’ Werdegang: Der allgütige Gott und die wertfreie Natur* (Würzburg: Königshausen & Neumann, 2001).

¹³⁴ This, again, can be seen as the point of divergence between Leibniz and Descartes—Nature for Descartes was free of value, whereas for Leibniz, it was the expression of uncorrupted value. See Leibniz’s *Théodicée* (1710), Spinoza’s *Tractatus Theologico-Politicus* (1670), as well as Wittgenstein’s continuation of this line in his *Tractatus Logico-Philosophicus* (1918).

here that among the great traumas abetted by the war was the outbreak of a major wave of witchcraft persecutions all throughout Europe.¹³⁵ Both were afraid, we can imagine, of the arrogance of human reason vis-à-vis the infinite and divine; and both tried to provide a place for the absolute to be accommodated with respect to mathematical science.

With a context painted thus, I can now articulate my model of the plot in Knobloch's article in a new version and suggest that (1) Descartes's faith credited geometrical constitutions as the sine qua non reference for his general method (mathesis) that seeks to respect the absolute through an attitude of "reservation"; and (2) Leibniz's faith credited algebraic computation as the methodology (mathesis universalis) to respect the absolute through "discretion."

Let me try to substantiate this speculative model by accumulating data in support of it.

TWO KINDS OF MATHESIS: GENERAL AND UNIVERSAL

Algebraic computation as a methodology can treat an object in infinitary manner. It can discrete an identity whose mathematical formulation as an equation may involve the summation of infinite series—at the cost of regarding the mathematical description of an object as an interpretation (an "exegesis") of divine law's manifestation in nature. As such, it cannot stand on its own. Science that proceeds in this manner cannot be set apart from theology—but the idea of God, as well as that of Scripture, is thereby altered. An algebraic computational description is to be understood as the conservation of an articulation whose original judgment has never explicitly been spoken or sentenced; its articulation is implicit in the singular and infinitesimally differential character of all things natural. Hence Leibniz's mathesis requires a novel script, which he calls a *characteristica universalis*. Such a *characteristica* is not an alphabet of vowels and consonants. It is a script entirely free from the postulation of being the descendent and heir of an original and supposedly pure language that had once been spoken, at some point distant in time (an Adamitic Language);¹³⁶ his *characteristica* is to introduce the novel script of a language of the universe that never ceases to originate the statements it captures and conserves.¹³⁷ Surprisingly so, Leibniz's spiritual conservatism is no less "modernist"

135 This wave of prosecution was eventually silted with the help of the Jesuit Friedrich Spee's influential book *Cautio Criminalis seu de Processibus contra Sagas Liber* (Juridical Caution and Concerns against the Witch Trials), first published anonymously in 1631.

136 See Umberto Eco, *Die Suche nach der vollkommenen Sprache* (Munich: Beck, 1995 [1993]).

137 This is how Serres can say, "The idea of an order through fluctuation [the dynamic order as it can be discerned by infinitesimal calculus] is not simply a new idea, it is the idea of novelty/news itself, it is its definition." I. Prigogine, I. Stengers, S. Pahaut, and M. Serres, *Anfänge: Die Dynamik—von Leibniz zu Lukrez* (Berlin: Merve 1991).

than Descartes's analytical constructivism—both invent and engender technical devices that are to reform and liberalize the oppression of universal science by provincial and feudal authorities; but Descartes's devices are geometric measuring tools, and Leibniz's devices are tools that support arithmetic "measuring tools."

Descartes's mathesis may well use characters of a novel kind, but it doesn't require a novel script. It doesn't aim at articulating and expressing nature immediately in its dynamics (by bypassing any assumed geometric constitutions of nature); rather, it aims at representing nature in general forms. Descartes's mathesis continues to put its faith in Euclid's geometric elements, and it regards the algebraic usage of the alphabet as a neutral and transparent "auxiliary device." For Descartes, *the order of nature is built of general finite forms*, that is why we can measure and represent their differences by his algebraic, analytic methods that allow one to do geometry with numbers and characters. For Leibniz, on the other hand, it is the methodology of how one can discern nature that is algebraic, not simply the method. And nature, the object of such a methodology, is not mediately constituted by a supposed static order. Leibniz regards nature in the implicate and infinitesimally differential terms of Divine Law whose sentences are formulated in the novel script he was trying to find (theodicy). He did not regard nature anymore in analogy to a cosmology (which would claim to be the pure interpretation of divine order and the laws that constitute it, hence supporting the idea of linear progress rather than Leibniz's intertwined and complex foldings). For Descartes, mathematical description of a natural object was possible only in the form of an arithmetic construction of the geometric constitutions. Hence, nature had to be free of value for him—a finite and mediate realm between God and Knowledge. The object that can be described mathematically had to be ascribed the finite character of *res extensa*, extension that fits in the coordinated space, rooted in the (theological) absolute as its point of origin (the zero point of the spatial coordinates). Such extension cannot possibly be infinite—otherwise no objective knowledge would be possible at all. For Leibniz, on the other hand—who must have refuted Cartesian skepticism as a pious hope, and the two substance metaphysics he developed in response to this skepticism as arrogant (he accuses Descartes of having set the limits of science by taking reference to his own mind)—wanted to use mathematics also for giving characterizations of an object's intelligibility, and this intelligibility was granted by an object's individuality (indivisible, continuous character) as it persists through time. For Leibniz this objective individuality cannot be grasped by the coordination of an object's extension in space alone, it needed the complement of an extension in time; hence he needed to interpret the characters applied in algebra in a manner that supports a novel script.

Let us return more closely now to the points Knobloch makes in his text, and use them as the reference points upon which we can project these ideas such that we can ponder their plausibility.

CARTESIAN LIMITS

Knobloch's first paragraph is entitled "From the Theory of Equations to Linear Algebra." He argues that in the eyes of Leibniz, algebra as applied by Descartes suffered from two imperfections: that the algorithmic solution of the general algebraic equation of n th degree was still unavailable, and that the geometric interpretation of algebraic equations did not suffice to comprehend transcendental problems in geometry. Transcendental problems in geometry refer to problems where irrational values like the number pi are involved, hence values where it is unknown if they are finite or infinite. Leibniz believed, like most of his contemporaries (as Knobloch tells us)¹³⁸ that the algorithmic solution to the general algebraic equation of n th degree was well within reach—yet as it turned out, it was not until Gauss, in the mid-nineteenth century, that this could actually be asserted, namely in the so-called fundamental theorem of algebra;¹³⁹ but this assertion was not a simple victory, it was also a disappointment. For on the one hand, the algorithmic solvability of the general algebraic equation of n th degree (provided the solutions are allowed to range over the complex number domain) was possible, but on the other hand, such algorithmic solvability introduces a degree of arbitrariness into the results of computed calculations that is proportional to the greatness of the exponent (the fundamental theorem of algebra states: algorithmic computations for an n -dimensional problem space—an equation of n th degree—operate within a solution space that accommodates n solutions). Regarding the second of the abovementioned "imperfections" attributed by Leibniz to Cartesian analytic geometry, namely its insufficiency in comprehending transcendental problems in geometry, Leibniz himself had made important contributions. In order to treat transcendental problems in geometry, Leibniz extended the Cartesian move to treat geometric elements in numerical terms, and suggested an algebraic treatment of number theory itself. Like this, he could find a way around what in geometry is the problem of the inaccountability of working with elements whose arithmetic number value expresses an irrational value—a problem that features in several guises throughout the history of mathematics, first and most famously perhaps with regard to the irrational number that sums up

¹³⁸ Knobloch, "Beyond Cartesian Limits," 114ff.

¹³⁹ See Harel Cain, "C. F. Gauss's Proofs of the Fundamental Theorem of Algebra," online at the website of the Einstein Institute of Mathematics, Hebrew University of Jerusalem, <http://math.huji.ac.il/~ehud/MH/Gauss-HarelCain.pdf>.

the value of a square's diagonal, namely the square root of 2. Leibniz maintained that it is not irresponsible to compute with such numbers in symbolic notations—as long as they cancel each other out in the final form a system of equations takes before it yields the function that will compute the result. With this suggestion, Leibniz applied the same kind of thinking that he used for inventing his calculus, where he allowed the impossible quantities of infinitesimals—Leibniz called them "fictitious quantities"—to feature in the equations (as long as they cancel each other out throughout the process of resolution). To put it drastically: the ratio between two voids, o/o , does make a "difference" in Leibniz's mathematics that can qualify and describe dynamic change—even though this difference is entirely symbolic (it can be expressed in neither negative nor positive terms). We will see in a moment how this apparent absurdity is acceptable to Leibniz on the empirical grounds of its applicability in statistical problems in mechanics that only Lagrangean analytical mechanics finally managed to systematize roughly one hundred years later, in the eighteenth century.¹⁴⁰ These problems involve a distributed "cause" that factors in a particular physical effect that can be observed and studied, for example in the curves produced by spirals.

Let us look at the way Knobloch expresses the difference between Descartes and Leibniz with regard to geometry:¹⁴¹ while Leibniz accepted Descartes's axiom that "exactness implies geometry," he rejected the other axiom of Descartes, namely to restrict geometry to analytical lines. But what must we imagine counts as an analytical line for Descartes? The curves of spirals are Knobloch's example of a non-analytical line.¹⁴² Descartes maintained that no exact description of such curves is possible, because "they depend on two motions that must be considered independent from one another. Human beings are not able to give their determined proportion."¹⁴³ Knobloch specifies that such curves would have to be described by "divine art, by means of an intelligence whose distinct thoughts are realized in time intervals which are smaller than any arbitrarily given time. This, he [Descartes] thought, did not apply even to angles."¹⁴⁴ There is one particular aspect where Leibniz took

¹⁴⁰ See Isabelle Stengers's first volume of her "Cosmopolitics" project for an elaborate account of the development from Cartesian mechanics via Leibnizian dynamics and its assumption of a *vis viva*, which transformed throughout the development of thermodynamics from metaphysical registers into physical ones, culminating in Schrödinger's concept of negative entropy as a measure of biological life—as well as volume 2 (*The Invention of Mechanics: Power and Reason*) and volume 3 (*Thermodynamics: The Crisis of Physical Reality*). Isabelle Stengers, *Cosmopolitics I* (Minnesota: University of Minnesota Press, 2010 [1997]).

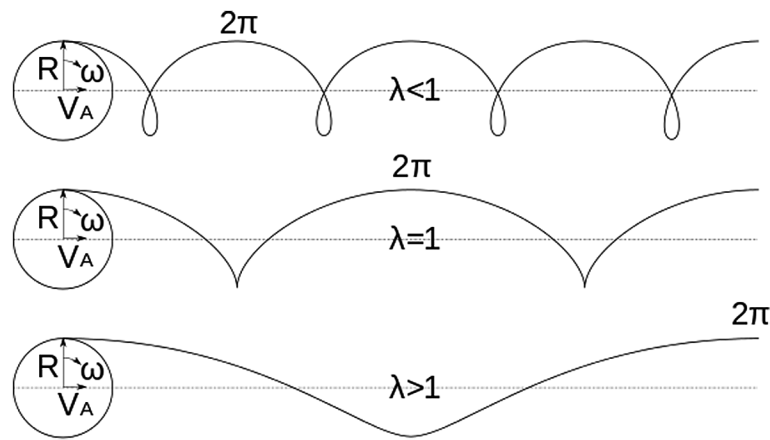
¹⁴¹ Knobloch, "Beyond Cartesian Limits," 116ff.

¹⁴² *Ibid.*, 117.

¹⁴³ *Ibid.*, 116.

¹⁴⁴ *Ibid.*

issue with Descartes's notion of exactness,¹⁴⁵ namely the latter's confusion of trochoids with spirals and helical curves. A trochoid is the curve described by a fixed point on a circle as it rolls along a straight line.¹⁴⁶



Such curves counted for Leibniz as analytical curves, while for Descartes they did not. Leibniz's infinitesimal calculus introduced time as a conservative magnitude that is capable of animating (temporalizing) the spatial dimensions of Cartesian constitutions. This combination of conservation and constitution marks the turn from mechanics to dynamics in physics. It eventually manifests itself in the distinction between force and energy.¹⁴⁷ The aspect that keeps being confused in this profiled view of the two mathematician-philosophers who both worked analytically, is that Descartes was reducing analytics to geometry, while Leibniz was breaking analytics open (symbolizing it, encrypting it) toward an arithmetics that operates with symbolic numbers. For Descartes, this gesture would have been presumptuous, arrogant, and inexact. Yet Leibniz's calculus can map movement into an empty form and compose with its sequences (Integrals and Differentials) of which each is characterized by variable values, just like Descartes's geometry can project formal extension into a neutral container space (Coordinate Space) and

¹⁴⁵ See Henk J. M. Bos, *Redefining Geometrical Exactness: Descartes' Transformation of the Early Modern Concept of Construction* (Vienna: Springer, 2001).

¹⁴⁶ See Eric W. Weisstein, "Trochoid," *MathWorld—A Wolfram Web Resource*, <http://mathworld.wolfram.com/Trochoid.html>. The image depicted here is taken from *Wikipedia*, s.v. "trochoid," <http://en.wikipedia.org/wiki/Trochoid>.

¹⁴⁷ Leibniz began to speak of the *vis viva* in distinction to the mechanical forces, but only in the beginning of the nineteenth century was the term "energy" introduced by Thomas Young instead of Leibniz's *vis viva*. See Jennifer Coopersmith, *Energy, the Subtle Concept: The Discovery of Feynman's Blocks from Leibniz to Einstein* (Oxford: Oxford University Press, 2011).

build analytical forms with its variable elements. As Knobloch explains, "Descartes adhered to a mathematically fixed, closed, static realm of geometry, while Leibniz adhered to a mathematically changing, open, dynamical realm of geometry in which the classification of lines depends on our current knowledge."¹⁴⁸ Knobloch also mentions a "dialogue" by Leibniz that is worth mentioning and discussing here (I put dialogue in quotation marks because it features Leibniz with a fictitious interlocutor): "But you will say, then we have realized the quadrature of the circle. I deny that we have a quadrature as desired. You say: 'By means of the circular trochoid, a moving curve, we have exactly a straight line which is equal to the circumference of the circle.' 'Yes,' Leibniz answered, 'if exactly, then certainly also geometrically. But not only a geometrical but also an analytical quadrature of the circle is required.'"¹⁴⁹

The problem of the quadrature of the circle is the classical locus where mathematicians have attempted to find a geometric measure for an infinite thought to actually exist (such as in the attempts to prove the existence of God mathematically). I read Leibniz's discussion here, in his imaginary dialogue, as a statement against the interpretation of his mathematics in the service of such a project. Yes, he agrees, his treatment of a moving curve must be seen as a geometrically exact quadrature of a circle, but this cannot be taken as a proof for anything beyond the consistency of the mathematical description, he maintains, because unlike Descartes, Leibniz did not restrict the mathesis of his analytical procedure to geometrical lines; he invented linear algebra, a method of calculation where geometry is subjected to permutations. His critique of Cartesian finite geometry is that it deprives science of a necessary aid—the usage of symbols for quantities that had to count (for a particular time being, at least), as *fictitious* quantities. "For Leibniz the boundary between geometric and nongeometric lines is not fixed once and for all. It can happen that a nongeometrical line becomes geometrical, hence a way of describing it is found [...] and that a nonanalytical line becomes analytical."¹⁵⁰

The necessary aid of which Leibniz speaks is the symbolic manners of expressing infinite series as mere auxiliary constructions in the service of a science of invention. Wouldn't that be a good definition for what remains invariant—the secret that is being kept—in the variate forms of analytics?

ALGEBRA IN THE SERVICE OF PARABOLIC INVENTION

But how to produce such auxiliary constructions? Leibniz proceeded by attempting an arithmetic quadrature of the circle. This involves an algebraic treatment of numbers—the packaging of numbers in the notations of symbolic code, such that they support the algebraic

¹⁴⁸ Knobloch, "Beyond Cartesian Limits," 118.

¹⁴⁹ Cited in *ibid.*, 116.

¹⁵⁰ *Ibid.*, 118.

procedures of substitution and elimination of factors in the resolution of an equation. “Consider the problem of dividing a ratio into a ratio of two irrational numbers,” Leibniz proposes.¹⁵¹ This has been an important aspect for learning how to compute curves that plot the dynamics of growth, and it has eventually cast off all remainders of meditative contemplation when a properly mathematical conception of growth was found that could be attributed, as a dynamic potential, to the base of a logarithm. The computation of growth dynamics has eventually become of central interest with the evolution of thermodynamics and system theory. But as far as Leibniz is concerned, his interest regarded neither (primarily) a science of biological or economic growth, but above all what he called “a new algebraic art” (*novae artes algebraicae*).¹⁵² Leibniz’s “new algebraic art” was for him at one and the same time *an art of invention* and a *universal scientific method* for the study of nature. The study of nature, we must recall, is the “mathematical exegesis” of the judgments of divine justice as they manifest in nature. In both aspects, it owes its exactness to geometry, but also in both aspects, it owes its universal character and its growing capacity for clear and distinct thought to a symbolic and crypto-analytic treatment of the infinite—an algebraic treatment, as his term “new algebraic art” suggests. With this, he broke with the largely unchallenged philosophical doctrine that subjects arithmetic combinatorics either to syllogistics, or to geometry (i.e., as Descartes did). For Leibniz, geometry provided methods to ponder infinitely the order of the Universe; for him, this order was neither static nor schematic. From his point of view, geometry did not provide an inventory of elementary forms, with which the postulated syllogistic truths of vocal-alphabetical script could be scrutinized in relation to the empirical manifestation of divine judgments in nature. His aspiration was not to measure the infinite. The infinite was to him a source for the creation of intelligible signs, signs that are not meant to be derived from a distant Original Language (vocal language) witnessed by tradition. The signs that can be created, so Leibniz imagined, are the signs of a symbolic language that is not meant to be—or to ever have been—spoken at all; its originality never ceases to be actual. Such is, for Leibniz, the nature of his universal *characteristica*, a symbolic language that can host *any* syntax, *any* vocabulary, *any* morphology that might be meaningful—now, in the past, or in the future. The rules of combination in his art of invention are an algebra of active thought, not syllogistic rules that would apply to how ideas can be represented to the mind via notions. The infinite gives birth to transcendental problems in geometry, those problems that allow the

151 Cited in *ibid.*

152 Cited in *ibid.*, 122; originally from G. W. Leibniz, *Sämtliche Schriften und Briefe*, Reihe 7, Band 3, 1672–1676, *Differenzen, Folgen, Reihen*, ed. S. Probst, E. Knobloch, and N. Gädeke (Berlin: Akademie Verlag, 2003).

pursuit of rational intellection to prosper more and more toward universality. Everything this depends on gravitates around the question of how sums of infinitely many terms can be computed.

Knobloch emphasizes two convictions that guide Leibniz’s ideas of how rationality is involved with the infinite:¹⁵³

1. There is no exception to Euclid’s common notion: the whole is greater than any part.
2. The same rules hold in the domain of the infinite as in the domain of the finite (law of continuity).

Another way to put the same question is whether there is (exists) a whole that is represented by the sum of an infinite series. But what is an infinite series for Leibniz? He assumes at first, and later finds assertion for this assumption, that some irrational numbers can be expressed in the terms of a series of rational numbers.¹⁵⁴ Even when he calculated parabolic areas by subtracting one infinite series from another, as Knobloch elaborates, Leibniz took the result of this computation to mean (1) that “this is quite wonderful and demonstrates that the sum of the series $1, 1/2, 1/3, \dots$ is infinite,” and then (2) that “this argument leads to the conclusion that the infinite is not whole and only a fiction. For otherwise, a part would be equal to the whole.”¹⁵⁵

This treatment of the infinite is an engagement with the fictitious—yet for Leibniz, the fictitious is not the negative or the opposite of the real. Thus the fictitious for Leibniz is real in the sense that it triggers effects, even though it does not, properly speaking, actually exist. Infinite terms are summed up, but the totals of these sums are fictitious—this does not mean that they are less real, but it does mean that they are not representations of “wholes.” In a third version of our theme, I want to ponder the question of whether and how we are still today Leibniz’s contemporaries with regard to how we deal with the problem of how infinite terms can be summed up. Let me briefly outline a postulatory matrix of six vectors with which I would like to consider this question.

1. Mathematics at large—including pure (or theoretical) as well as applied mathematics—is currently not a general focus for intellectuals.
2. The millennia-old and inherited understanding of *mathematics as the art of learning* (intransitively so: learning in general,

153 Knobloch, “Beyond Cartesian Limits,” 122; cf. also Mark von Atten, *Essays on Gödel’s Reception of Leibniz*, Husserl and Brouwer (Vienna: Springer, 2015), here ch. 2 “A Note on Leibniz’s Argument Against Infinite Whole,” 23–32.

154 “There cannot be any doubt that some series are equal to irrational numbers though they consist of rational numbers. This must be investigated.” And so he did, which led his research to an arithmetic quadrature of the circle in the series $\pi/4 = 1 - 1/3 + 1/5 - 1/7 + \dots$; see G. Ferraro and M. Panza, “Developing into Series and Returning from Series: A Note on the Foundations of Eighteenth-Century Analysis,” *Historia Mathematica* 30 (2003): 17–46; and Knobloch, “Beyond Cartesian Limits,” 123.

155 Cited in Knobloch, “Beyond Cartesian Limits,” 124.

not learning something in particular) has largely been stripped of its spiritual character; in its flirtation with the unbound, the infinite, the immense and colossal, mathematics has been stigmatized as pathologically immoderate, and its technical-artistic character has been broken up and subjected to techno-logical regimes that are to watch over and guarantee mathematics' entirely pragmatic services to its diverse fields of application.

3. Some of these techno-logical regimes proceed in the age-old pursuit that relates mathematics to learning,¹⁵⁶ but they *subject this learning to an objective*, they specify its constitutive intransitivity (not to be aimed at something in particular) to particular goals, aims, and values.¹⁵⁷
4. Objectivity, thereby, cannot be considered as free of subjective interests; it becomes instrumental for competing interests in mobilizing their respective support; *this instrumentalism needs to be complemented with the virtual and spiritual mode of an expectationalism*.
5. There is an *agoratic reality to objective interests* that characterizes them as possibly incommensurate.
6. In response to this, among intellectuals an increasing uneasiness is registered toward a certain *capitalization of knowledge* (keyword: Corporate Science) that results from the predominance of applied science or, intimately related, “techno-science.”

**THEME ONE, PLOT THREE:
NAMING THAT OF WHICH WE KNOW NOTHING**

WE ARE LEIBNIZ'S CONTEMPORARIES

So, having outlined our postulatory matrix of the larger context, are we still Leibniz's contemporaries, having difficulties sorting out how the domain of mathematics is being governed in the interplay between algebra, geometry, arithmetics, logics, and poetics? Before global politics of science took this turn toward applications in the postwar era of the mid-twentieth century, intellectuals were not ignorant of the very logics behind those symptoms that we can empirically register today (vectors 1 to 6 above). While the trust in a certain sobriety that applied mathematics (science) promises against the danger of ideas is more than well understandable today, after the services that abstract reasoning has delivered

¹⁵⁶ For example in the research on neural networks and computational agency. Matteo Pasquinelli has aptly characterized such “teleology” in “The Eye of the Algorithm: Cognitive Anthropocene and the Making of the World Brain,” November 5, 2014, <http://www.matteopasquinelli.com/eye-of-the-algorithm/>. The article was published in German in *Springerin*, October 2014.

¹⁵⁷ Perceptive to this, Pasquinelli also exposes algorithms as functions of capital. See Matteo Pasquinelli, *Gli algoritmi del capitale* (Verona: Ombrecorte, 2014).

to political programs of social cleansing in fascist nationalisms, a certain tragedy inherent to this promise was perfectly lucid already then: Herman Weyl, for example coined an important phrase that captures the entanglement of scientific values and salvational/utopian (de)(il)lusions that is irreducible even in the sheer pragmatism of applied science. He wrote: “In these days the angel of topology and the devil of abstract algebra fight for the soul of every individual discipline of mathematics.”¹⁵⁸

Even if we refrain from relating to the domain of mathematics at large, and instead withdraw theoretical ambitions positivistically to particular regimes of application, a hegemonic competition about identifying the larger good, the meaningfulness and worth of intellectual efforts, remains virulent and cannot be neutralized. Or perhaps it is even worse, and the self-imposed deprivation from making sense of mathematics' intellectual power in its entanglement with the Christian narrative of the fall of humanity from innocence and paradise, or in its entanglement with the Enlightenment narrative of emancipation and peaceful cosmopolitics in the overcoming of mankind's animality, by acquiring a fully human nature through education, has not relaxed but, contrarily so, stirred up and initiated the attributive “localization” of—forgive me for putting this so bluntly—“where the evil might reside” that apparently inhabits, unsettles, and seduces an unchecked intellect. Considering ourselves Leibniz's contemporaries with these questions helps to sober up blind, violent, yet impotent activism.

ALGEBRA'S SCOPE OF INFINITARY DISCRETION

Let us refer once again to Knobloch's article, which he starts with a quotation by Paul Valéry that praises algebra: “Is there a more divine human idea than naming that of which we know nothing? I can engage that of which I am ignorant in the constructions of my mind; I can turn an unknown something into a component of the machinery that is at work in my thinking.”¹⁵⁹ It is difficult to imagine a better way to express the scandal of algebra. Its claimed aspiration, as formulated by Valéry, is to be able to name that of which we know nothing; but now, to name is to address something in its identity. How could that possibly be done without imposing upon it an identity that cannot be its genuine one? Algebra claims nothing less than to be able to “identify” a something without subjecting the infinity of its impredicativity to a finite order. There is a classical problem to which Knobloch turns when attempting to work out Leibniz's critique on Descartes, namely the problem of the possibility of measuring a circle. In the history of mathematics, there is a long tradition of thinking of the infinite through the figure of the circle because the

¹⁵⁸ Hermann Weyl, “Invariants,” *Duke Mathematical Journal* 5, no. 3 (1939): 489–502.

¹⁵⁹ “Quelle idée plus digne de l'homme que d'avoir nommé ce qu'il ne sait point ? Je pus engager ce que j'ignore dans les constructions de mon esprit, et faire d'une chose inconnue une pièce de la machine de ma pensée.” Paul Valéry, *Alphabet* (Paris: Librairie générale française, 1999 [1904/05]), here cited in Knobloch, *ibid.*, p. 113; my translation.

circle can never be exhaustively measured. A circle comprehends everything it encompasses—it is therefore the one element that is central to theoretical geometry. It can provide a common compass between things that appear as incommensurate or immense, nonmeasurable, because it expresses self-reference as a relation, and is capable of handing us this relation as a device to operate with. In mathematics, the circle is the stepping stone to theoretical geometry: what counts as the “Thales moment” in the history of mathematics refers to Thales coming up with his famous theorem that states how quantities might be extended or diminished to infinity while keeping their ratio as well as their proportionality. The theorem postulates a “logos” as “a manner of speech” that articulates an identical relation through the totality of its possible variations. Such a relation of identity is called an “invariance” because it collects all combinatorial manners of how variants of this self (whose identity is being determined by the invariance formulated in the theorem) might relate to themselves. Without determining his own “self,” or that of the pyramid that he wanted to measure, Thales’s insight was to draw one circle around himself and one around the pyramid, and to postulate that *theoretically* everything that is comprehended by one circle (encompassing himself whatever he might be) must be commensurate with what is comprehended by the other circle (encompassing the pyramid, whatever it might be).¹⁶⁰ Hence he could establish a space of similarity where the sun’s effects on either one of these “impredicate selves” could be counted upon as being in proportion to each other—a proportion that pertains to the *mediacy of the abstract locus* established by the two circles, is not a proportion that is rooted in an *immediate cosmic order* (as it arguably characterizes many readings of Plato’s *Timeaus*).¹⁶¹ Thales established a

160 See Michel Serres, “Was Thales am Fusse der Pyramiden gesehen hat,” in *Hermes II: Interferenz*, trans. Michael Bischoff (Berlin: Merve Verlag, 1992 [1972]), 212–39; also my article “Arché, Arcanum, and Articulation.”

161 Many readings leave unthematized that both of Plato’s spheres, the corpuscular inner circle of becoming as well as the ideal outer circle of being, have the same elementary “materiality”—this aspect is crucial because it provides for the possibility that the cosmos can at all be “counted” (otherwise it would not be a cosmos, an order). It is an “elementary materiality” of a partitioned whole, and I suggest to call it “numerosity.” I am citing from Benjamin Jowett’s translation, provided by MIT Classics (<http://classics.mit.edu/Plato/timaeus.html>; np). In Plato’s account, both circles that make up the cosmic animal are engendered by the Demiurg out of the soul of the universe, which he assumed that was made up of three irreducible elements: the same, the other, and essence. He mingled these “into one form, compressing by force the reluctant and unsociable nature of the other into the same.” Plato continues that “when he had mingled them with the essence and out of three made one, he again divided this whole into as many portions as was fitting, each portion being a compound of the same, the other, and the essence.” This partitioned whole “he took and stretched it and cut it into two,” and “crossed, and bent [it] such that the ends meet with ends.” Like this, two intertwined circles are created, an inner and an outer, and we are told that the Demiurg had them revolve around the same axis. The motion of the outer circle is called the Same, and the motion of the inner circle that of the Diverse. To the outer circle belong the intelligible forms that characterized Being, and to the inner belong the visible and corporeal bodies that characterized Becoming.

logos of similarity whose metrics is operative in the efforts of describing, representing by naming; this peculiar logos is not itself descriptive or representational to anything external to what it can account for immanently to itself. It is a metrics that discretizes and renders commensurable. Such a logos of “speaking mathematically” constitutes the symbolic auxiliary structure that supports and enables “logistic mobility,” in the sense that it mobilizes all that pertains to the particular logos it constitutes—i.e., to all that can be reasoned within the grounds of such a logos. The relation of identity established thereby—identity as an invariance—is “autogenic,” “self-engendering,” of all that might once be recognized as being comprehended by this identity within the scope of infinitary discretion. It is an impredicate identity, and its impredicativity cannot simply be grasped as the negative of predicativity. Bertrand Russell introduced these terms in relation to the problem of “completed infinities,” as it emerged from a conflict between Cantor’s introduction of the transfinite on the one hand, and, on the other, the interest in exploiting this theory of the transfinite for the development of a logics that can be foundational for mathematics at large. Such a logics, again, was imagined by Frege as a kind of logos in the sense I’ve used this term above—it was the logics of a *Begriffsschrift* (a Concept Script).¹⁶² The idea thereby was that we might treat every word theoretically in this “Thales gesture”: a concept gives the definition of the word, but this definition ought to be considered as a circle (i.e., as infinitely comprehensive). As such, it can accommodate all one might ever find out about the reference of words. Such a script would do away with literacy, poetics, the rhetorical power of speech, and articulation; it would capture and conserve bare truth values of words. The promise of such a concept script was threefold: (1) to abstract from the role of the alphabet and its mystical, mythological, and theological character that so preoccupied late nineteenth-century philology in its quest for reconstructing a truly original language that could accommodate all the vernaculars;¹⁶³ (2) to break the link between

162 Gottlob Frege, *Begriffsschrift: Eine der arithmetischen nachgebildete Formelsprache des reinen Denkens* (Concept Script: A Formulaic Language of Pure Thought Modeled According to Arithmetics, 1879). This contrasts strongly with the plotting of the same theme by Frege’s contemporary George Boole, who did not depart from the idea of one homogenous arithmetic, as Frege arguably does, but tried to come to terms with arithmetic “locality” in relation to symbolic sets of numbers (fields, rings, ideals, etc). Boole’s plot was entitled *An Investigation of the Laws of Thought on Which Are Founded the Mathematical Theories of Logic and Probabilities* (1954). In light of our computational paradigm today, for which Boole’s Algebra plays a constitutive role on the physical hardware level for the control of electrical power, it is important to remember that what electro-engineers call “Boolean Algebra” today has not all that much to do with Boole’s Algebra as a philosophical topos (which for Boole it was). See Theodore Hailperin, “Boolean Algebra Is Not Boole’s Algebra,” *Mathematics Magazine* 54, no. 4 (September 1981): 172–84; as well as Walter Carnielli, “Polynomizing: Logic Inference in Polynomial Format and the Legacy of Boole,” available at <ftp://logica.cle.unicamp.br/pub/e-prints/vol.6.n.3.2006.pdf>

163 See Umberto Eco, *Auf der Suche nach der Vollkommenen Sprache*.

meaning and oral traditions, in favor of an ever incomplete universal meaning—such meaning can hardly come from a particular oral tradition without introducing aspects of racism and fascism into philosophy and science; (3) to liberate (or at least to relax) the pursuit of knowledge (and with it the political role of science) from its theological entanglements with eschatological ideas (as it pertains to the idea of scientific progress that constitutes modern values at large).

“NATURE IS THERE ONLY ONCE”: THE PROMISE OF A GENERAL METRICS

By modern values I mean here the principle discrediting the authority of traditions as a means to allow for their coexistence. The strong distinction between culture and nature grows from these values—the famous statement by Ernst Mach, that nature is there only once (“Die Natur ist nur einmal da”)¹⁶⁴ captures the stance of many physicist-philosophers between the last decade of the nineteenth century and the first three decades of the twentieth century.¹⁶⁵ To make a long story very short, Russell’s problem of impredicativity, that of the possibility of a “completed infinite,” threatens to thwart this threefold promise of a script that does not accommodate, conserve, and host the meaning and customs of oral traditions, but one that only accommodates facts of universal value. Such a script would have been a truly modern technique of how to conserve and exchange knowledge without participating in a hegemonic struggle between different customs that would, inevitably, select and impose particular cultural values over others on arbitrary and contingent grounds. Tied to the idea of such a script was that it could establish a reality of facts adequate for developing international law based on universal human rights and universal customs of conduct. With such a script we would have a cultural technique with which the circle of conquest and revolution, expansion and seclusion, might be broken and bring at one distant point in the

164 Ernst Mach, “Die ökonomische Natur der physikalischen Forschung,” lecture, Imperial Academy of Sciences, Vienna, May 25, 1882. The entire paragraph goes as follows: “Wollten wir der Natur die Eigenschaft zuschreiben, unter gleichen Umständen gleiche Erfolge hervorzubringen, so wüßten wir diese gleichen Umstände nicht zu finden. Die Natur ist nur einmal da. Nur unser schematisches Nachbilden erzeugt gleiche Fälle. Nur in diesem existiert also die Abhängigkeit gewisser Merkmale voneinander.” In English translation (my own): “If we wanted to attribute those properties to nature, which yield the same results given the circumstances are the same, we wouldn’t know how to find these same circumstances. Nature is there only once. Only our schematic representation produces cases that are comparable. It is only in the latter that a certain causal dependency between cases exists.”

165 I owe much of the perspective I am outlining here to a talk given by quantum physicist Françoise Balibar at the Society for European Philosophy’s conference “Philosophy after Nature” in Utrecht in 2014. Her paper features Mach’s statement as a title, and explores the particular notion of precision that originates in this context, and that is so much at odds with the physics of quantum science.

future global peace for a cosmopolitical world society.¹⁶⁶ Physics, with its central axiom that there is only one nature, came to play the role of a paradigm in this context.

But the conflict exposed by Russell with the problem of a completed infinity insists in Mach’s own formulation: for it remains indifferent about what such uniqueness might mean. Does it mean that nature is a *singular* phenomenon? Then how can one possibly account for the regularity that supports the pursuit of science in the first place, and whose mastership allows for the development of all the technics around which civilizations evolve, prosper, or collapse? If the uniqueness of nature means that there is nothing that compares to it, then how can it be “one,” how can one account for the uniformity and homogeneity that is to distinguish things natural from things cultural? This problem—how Nature’s uniqueness can be reconciled with the postulate of the existence of natural laws assumed as responsible for the regularities that can be discerned and conserved from studying nature—was treated by recourse to the analysis of functions as analysis based on calculus.¹⁶⁷ Crucial for this understanding of uniqueness was the concept of single-valued functions as one-to-one or one-to-many mappings. In the theory of functions, *eindeutig* (unique) means that the character of whatever is qualified as *eindeutig* is uniquely or unambiguously determined. According to the then-prevalent view, “the concept of function constitutes the general schema and model according to which the modern concept of nature has been moulded in its progressive historical development.”¹⁶⁸ By making this import from mathematics to physics, something crucial happens: what in the former is a *mode of determination* (*Bestimmungsweise* is Riemann’s term for this) is being epitomized and—illegitimately so—attributed to the thing itself that is being determined in this particular mode (namely, in this case, that of single-valued functions). The hope for a manner of conserving universal meaning, with all its apparently entirely secular and political implications, which Russell saw threatened by the problem of a completed infinite, and which he strived to render solvable by introducing the distinction between predicativity and impredicativity, depends upon the transparency and neutrality between the (mathematical) manner of determination of a natural thing in terms of functions, and the attribution of this determination to the thing itself. In short, it depends upon the propagation of metaphysical univocity masked as mathematical

166 It is no coincidence that these same decades (late nineteenth to mid-twentieth century) were also when theories of societies were formulated, and where sociology appeared with its claim as *Universalwissenschaft* (universal science) based on the aspiration that it can mediate between the positive (natural) sciences and the fields of hermeneutic and cultural knowledge.

167 Ernst Cassirer, *Substanzbegriff und Funktionsbegriff: Untersuchungen über die Grundfragen der Erkenntniskritik* (Berlin: Verlag von Bruno Cassirer, 1910).

168 *Ibid.*, 27; my translation.

uniqueness. As Françoise Balibar, from whom my interest in Mach's dictum here is crucially inspired, noted somewhat dryly: "Univocity has migrated from a characteristics of some mathematical objects (functions of a certain type) to Nature itself."¹⁶⁹ After a pause she continued: "One hundred years later, this sounds silly." First, Balibar elaborates, "we know now that functions only form a class of mathematical objects, a very restricted one for that matter, associated to the ideas of number and quantity." And secondly, she continues, "not only mathematics have changed but physics too. It has evolved by enlarging its mathematical toolbox to vectors, quaternions, tensors, matrices, numbers of all kinds, geometrical objects, *n*-dimensional spaces, etc., for which unique determination is not an issue."¹⁷⁰

SYMBOLISMS AND MODES OF DETERMINATION

In mathematics, these novel tools had already been invented and formalized in the nineteenth century—they had been available for Mach, Frege, Russell, and company. They found application mainly in the novel fields of electro-engineering and operations research, and a little later in information science. It is a significant symptom that this entire branch of nonclassical mathematics has largely been ignored by the guild of physicist-philosophical intellectuals devoted to developing a social theory for modern society. With referring to these mathematical concepts as nonclassical, I borrow another distinction from Balibar, who used that term to indicate how "nonclassical" determinations, as opposed to "classical" ones, make no reference to geometry at all; or more precisely, they do not refer to geometry in a way that is not already *mediated by the manner* of determining the elements and axioms that constitute a particular geometry. She rightly points out that this distinction originates in nineteenth-century mathematics, specifically so in Riemann's introduction of a notion of multiply extended manifolds in his habilitation paper *Hypothesen, welche der Geometrie zugrunde liegen* (1854), as well as in Boole's algebra with which, from his early work in *The Mathematical Analysis of Logic* (1947) to his later *An Investigation of the Laws of Thought on Which Are Founded the Mathematical Theories of Logic and Probabilities* (1854), he generalized algebra from "being conversant to numbers and quantities" only, and raised it to a status of being conversant to symbols in general. I call it, a bit unjustly perhaps, a significant symptom because the claim of Nature's uniqueness, without considering how to account for valuing planar geometry (Euclidean coordinated

169 I am citing from my own notes taken during her lecture in Utrecht. Balibar's manuscript will be forthcoming in Rosi Braidotti and Rick Dolphijn, eds., *Philosophy after Nature* (expected 2016).

170 Ibid.

into three dimensions and one point of origin by Cartesian geometry) above any other of the projective geometries that can be formulated with—from a purely formal point of view—equivalent consistency, is strictly at odds with the values of modern, secular science and the latter's emancipation from metaphysics and theology. Russell himself was deeply aware of this, as his PhD dissertation from 1899 testifies. It was clear to him that the aspired universality of statements that characterize nature in her uniqueness depends upon the indisputable universality of a metrics. Speaking of manners of mathematical determination contradicts this possibility. It introduces into mathematical determination problems of a similar kind to those that pertained to linguistic determination, and that led in the domain of the latter to this dangerous quest of an original language that—if not a straightforward Adamic language—then in any case a language with "objective" claims of being superior above all others that are merely derivative to it. It is clear that together with such a language, a people conversant in that language could also claim "objective" superiority of their culture over any other. So a generic universality of metric geometry (geometry as providing such a universal metrics) was what Russell set out to defend against the topological geometries developed by Riemann (and Grassmann's Exterior Geometry).¹⁷¹ The threat he saw resides in the loss of scalability that would result from the abstinence from a universally valid metrics. Topological geometry *constitutes* metrics, and it does so in many different ways; measured quantities, hence, cannot simply be scaled up from the local to the global, or inversely, derived from the global and applied to the local. Russell's supervisor in this research was Whitehead, with whom Russell later collaborated in a joint project of establishing first principles for mathematics, their *Principia Mathematica* (1910–13). Whitehead too was well aware of the dilemma around metric geometry and topological geometry. But he considered all aspects on the level of their algebraic formulation—he considered that the topological geometries are simply *algebraic* articulations of geometry (of which planar geometry was one species). He was one of the first to aim at systematizing all the nineteenth-century findings in algebra of non-single valued mathematical objects (vectors, matrices, scalar products, algebraic integers, etc.). He collected them under the aspect of "universality"—only, and in this he differed substantially from Russell, he attributed universality to algebra (not to a particular geometry and its metrics). The term universal algebra was in fact coined by Whitehead's book *A Treatise on Universal Algebra*

171 Hermann Grassmann, *Die lineale Ausdehnungslehre* (Leipzig, 1844); and its English translation *A New Branch of Mathematics*, trans. Lloyd Kannenberg (Chicago: Open Court, 1995). See also Hermann Grassmann, *Geometrische Analyse geknüpft an die von Leibniz erfundene geometrische Charakteristik* (1847), <http://quod.lib.umich.edu/cgi/t/text/text-idx?c=umhistmath;idno=ABN8108>.

from 1898.¹⁷² His aim in this study was to present “a comparative study of the various Systems of Symbolic Reasoning.” Those Systems of Symbolic Reasoning, as Whitehead calls them, had been looked upon “with some suspicion” by mathematicians and logicians alike—as he puts it: “Symbolic Logic has been disowned by many logicians on the plea that its interest is mathematical, and by many mathematicians on the plea that its interest is logical” (vi). In short, for Whitehead it was not clear how the characters of a script can be distinguished depending on whether they are used in descriptions of things cultural (language based) or in descriptions of things natural (mathematics based). The superiority of nature’s uniqueness over any culture in particular depends on this distinction. The broad reservations among analytical philosophers against Whitehead’s move (apparently) backward, namely from epistemology to metaphysics, is surely related to this. Developing a new metaphysics lends itself hardly to mobilize short-term activism, and it arguably contradicts the view that societies can be “planned” and “theorized” purely pragmatically—something Russell, in distinction to Whitehead, appears to have believed in.¹⁷³

PSYCHO-POLITICAL STRUGGLE AROUND THE CARDINALITY AND ORDINALITY OF SUMS (TOTALS)

This may sound like an ivory-tower problem, and reading something subjective about Whitehead’s and Russell’s personal commitments to politics out of it may sound like an illegitimate and far-fetched culmination, an attempt to make something irrelevant appear more relevant. But if we consider the characterization given in the classic textbook *The Development of Mathematics* (1950) by E. T. Bell, we find a lucid translation of what I see to be at stake. Bell writes: “Cayley’s numerous successes, quickly followed by those of the prolific Sylvester, unleashed one of the most ruthless campaigns of totalitarian calculation

¹⁷² This difference also explains how Russell and Whitehead parted ways as philosophers after the crisis of the “completed infinite” was explicit (the problem of impredicativity). While Whitehead returned to the legacy of metaphysical philosophy and attempted to engender a metaphysics of processes and multiply dimensional extension—completely at odds with modern values in the eyes of many—Russell did not dare to look for a different manner of how the same hopes might be supported. This also came to be the point of conflict between Russell and his younger disciple, Ludwig Wittgenstein. The latter expressed at one point the problem pertaining to a complete infinite, in relation to a logics or a script of purely universal values, by challenging his readers: “Ask yourself whether our language is complete;—whether it was so before the symbolism of chemistry and the notation of the infinitesimal calculus were incorporated in it; for these are, so to speak, suburbs of our language. (And how many houses or streets does it take before a town begins to be a town?) Our language can be seen as an ancient city: a maze of little streets and squares, of old and new houses, and of houses with additions from various periods; and this surrounded by a multitude of new boroughs with straight regular streets and uniform houses.” Ludwig Wittgenstein, *Philosophical Investigations*, trans. G. E. M. Anscombe (London: Wiley-Blackwell, 1991), 16.

¹⁷³ See Bertrand Russell, *The Scientific Outlook* (London: Routledge 2009 [1954]).

in mathematical history.”¹⁷⁴ Arthur Cayley and James Joseph Sylvester were leading mathematicians in the field of so-called quantics, the study of algebraic form. An algebraic form comprehends a quantity that remains invariant throughout the application of particular transformations. The quantity to which a particular combinatorics applies would be an invariant quantity. The form or concept of such a quantity can only be given as an algebraic form (as a group or ring ranging over a particular field or module). An invariant quantity is not the same as a constant quantity: a constant is expressed explicitly by one particular value (as, e.g., the speed of light in a vacuum) hence (from a purely operational, formal point of view) it must be understood as one manner of determining a quantity of which we can say that it is invariant. Of such a quantity, we cannot give an explicit value. For example, one particular invariant quantity that physics cannot dispose of is energy. While the assumption underlying dynamics as a science today is that the total amount in the universe cannot be altered, no one could actually give a particular value that expresses how much this total amount is supposed to be. It is the distinctive mark of algebraic form, and the invariant quantities they express, to render a diversity of solutions that are all equally possible within one particular solution space. The solution space, thereby, is mathematic and cannot be directly identified with the physical situation we seek to describe mathematically. In short, to speak of invariants as constants necessitates a metrics according to which the value can be determined. To put it polemically: it would be Russell’s stance, not Whitehead’s. So let us think closer about why quantics, the study of algebraic forms, might have been associated by Bell with “one of the most ruthless campaigns of totalitarian calculation in mathematical history.” Bell continues:

Such misdirected foresight was not peculiar to the algebra of quantics in mathematics since 1850. In the accompanying theory of groups, for example, especially permutation groups, there was a similar panic. Once the means for raising unlimited supplies of a certain crop are available, it would seem to be an excess of caution to keep on producing it till the storehouses burst, unless, of course, the crop is to be consumed by somebody. There have been but few consumers for the calculations mentioned, and none for any but the most easily digested. Nevertheless, the campaign of calculation for the sake, apparently, of mere calculation did at least hint at undiscovered provinces in algebra, geometry, and analysis that were to retain their freshness for decades after the modern higher algebra of the 1870s had been relegated to the dustier classics.¹⁷⁵

¹⁷⁴ E. T. Bell, *The Development of Mathematics* (New York: Dover, 1992 [1950]), 429–30.

¹⁷⁵ *Ibid.*

Bell describes how abstract, symbolic Algebra appeared like an “undiscovered continent” on the horizon. Those who pushed the application of the symbolic method without dedicated political or economic commitment were “adventurers,” whom Bell calls “illegitimate Kings” striving for “profit.” Masses of young mathematicians were recruited, he writes, who mistake the “kingdom of quantics” for the “democracy of mathematics.” Quantics was the name of the branch that studied algebraic forms before it turned into a general theory of invariances. Leading algebraists were accused of mobilizing “totalitarian” regimes of calculation, by recruiting mathematicians for theory without applications and use. If we recall the decision communicated by the French Academy of Science shortly after the French Revolution, that the classical mathematical problems like squaring a circle should no longer be credited within institutional science because they consume the workforce of mathematicians for metaphysical interests, it seems understandable that the attractiveness of studying algebraic forms for their own sake (*intransitively* so, to make a link back to our earlier discussion of how mathematics ceased to be the non-teleological art of learning) was perceived as an offense or even deceit of Enlightenment values. In effect, it was stigmatized a political threat. While this is well understandable in a situation where societies undergo unprecedented change through industrialization, and where guidance for this process is most urgently needed, it nevertheless seems somewhat inconclusive to accuse algebra of “totalitarianism.” Let us consider how the idea of a totality relates to the one term that is at the heart of the impredicativity problem: the idea of a *completed infinite*.

A total is a sum. It is an arithmetic concept and it relates to the operation of addition. But depending on how we think about the status of the mathematical symbols that are being “summed up,” a “total” is something very different in kind. Cantor’s distinction of how we can clarify our notion of numbers in his transfinite mathematical universe, that between ordinality and cardinality, is helpful to see how a “total” can be different in kind. We can think of the symbols being added up (1) as placeholders for *cardinal values*, i.e., as indexes to something like the corpuscular or the magnitudinal aspect of Cantor’s countable, transfinite universe. In the terms of such a sum, the totality of a *completed infinite* would refer to a constant quantity. On the other hand, (2) we can think of those symbols as placeholders for *ordinal values*—i.e., as indexes to the immaterial and multitudinal aspect of Cantor’s countable Universe. In that case, the completed infinite of a total would refer to an invariant quantity. A completed infinite can be thought of as an invariant or as a constant, and they differ in kind, so we claimed. But how so? I would like to come back to the one aspect in science that is indisputably treated as an invariant: energy. The laws of physics, since the advent of thermodynamics, make one fundamental assumption,

namely that the amount total of energy in the Universe be invariant. Energy cannot be created nor can it be consumed. What can change, form, and/or dissolve is the organization of how energy is compartmentalized, captured, and stored in the chemical and climatic metabolism of the elements. No assumption needs to be made regarding an explicit figure this total of energy in the universe is thought to amount to. Rather, it is an assumption that provides a proportionality for making calculations with respect to subsystems within the universe—like those pertaining to a solar system, or more narrowly to the ecosphere of planet Earth, for example. For those subsystems, all calculations depend on naming an explicit value for the stocks of energy that are being traded and transformed within such a dynamic system. The assumption of such constant values as defining the limits of the system is what allows identifying systems in the first place—as an epitomized ideality. We can take this latter as an illustration of a *completed infinite in the terms of cardinals*, and the former as an illustration of a *completed infinite in the terms of ordinals*. The amount total as a universal invariance in terms of ordinals is an indispensable hypothesis that can never be verified by finite, empirical means; any attempt to represent its validity would be *presumptuous* in the literal sense of this word¹⁷⁶—it would, illegitimately so, foreclose and take for granted that which can be named “algebraically” (in the sense of Paul Valéry), but for which no one measure exists. But the assumption of this hypothesis is a cornucopia out of which can be engendered numerous manners of ordering, and hence also of counting, the relationally nested infinities (totals) that stratify topoi of relative locality and globality.

THE PRESUMPTUOUSNESS OF UNIVERSAL MEASURE

The locus classicus for thinking about this is the so-called continuum problem in mathematical number theory. We can refer to its illustration of real numbers as an infinitesimally continuous line as an attempt to picture the idea of nested infinities: each number class comprehends an infinity—for one, the double infinities of the integers (to the negative and to the positive), and then the orthogonal infinities of the real numbers that are spacing out between any single one of the integer segments. It is an illustrative case for our context, because the two founding intellectuals of modern set theory, Richard Dedekind and Georg Cantor, each explained their respectively attributed meaning to the number class concept, and the mathematical idea of sets, with recourse to the continuum problem.

176 From the Latin *prae*, “before” + *sumere*, “to take,” meaning “the taking of something for granted” as is attested in English from c. 1300. *Online Etymology Dictionary*, s.v. “presumptuous (adj.),” http://www.etymonline.com/index.php?term=presumptuous&allowed_in_frame=0.

First steps toward an idea of sets came with Dedekind's research into algebraic number theory. "In the context of his work on algebraic number theory," José Ferreiros accounts in his *Stanford Encyclopedia* article on the early beginnings of set theory, "Dedekind introduced an essentially set-theoretic viewpoint, defining fields and ideals of algebraic numbers. [...] Considering the ring of integers in a given field of algebraic numbers, Dedekind defined certain subsets called 'ideals' and operated on these sets as new objects. This procedure was the key to his general approach to the topic [...] Thus, many of the usual set-theoretic procedures of twentieth-century mathematics go back to his work."¹⁷⁷ We must not go into details here, but we can see at once that what inspired the controversial illustration of how sets are thought to establish a transfinite realm where they nest among each other, all comprehended and accommodated in the one exhaustive line of real numbers imagined as an infinitely capacious continuum, was an idea quite different in character. It was that of thinking about the integers as a ring rooted in a field of algebraic numbers. The character of this image is discrete, not continuous; discrete here meaning that the domain of the rational numbers that the integers establish is only partial and not coextensive to a "rationality" that would pertain to the "natural numbers" as such. In effect, numerical calculation is confronted by multiple "rationalities." The *A* rationality provides a common denominator, and the promise of "rationalization" is that it makes things measurable and comparable without qualifying them in subjective manners. We have seen earlier how the advent of algebraic geometries in topology threatened to thwart the salvational hope for a one universal metrics applying to the singularity of nature (in distinction to having to achieve such a metrics by "mutual acculturation"). Dedekind's algebraic number theory forms complicity with topology in thwarting hopes in this salvational promise. Together with topology, algebraic number theory appears like the fall from what Cantor imagined as a paradise (recalling David Hilbert's famous words that "no one shall drive us from the Paradise which Cantor has created for us"). With it, we not only have to deal with many geometries (in topology), but also with many arithmetics (in distinct algebras or, as Whitehead called them, systems of symbolic reasoning).

DISCRETE INTELLECTION OF INVARIANCES VS. MEASURING THE CONTINUITY OWED TO CONSTANT VALUES

We can see in Dedekind and Cantor the two archon minds in pursuit of philosophies respective to the two different kinds of completed infinities, one in terms of ordinals, one in terms of cardinals. The one in

¹⁷⁷ José Ferreiros, "The Early Development of Set Theory," in *Stanford Encyclopedia of Philosophy*, ed. Edward N. Zalta (Winter 2012), <http://plato.stanford.edu/archives/win2012/entries/settheory-early/>.

terms of ordinals, that whose total amount figures as an invariance and can be named only algebraically (i.e., in encrypted manner, not "immediately" or "naturally"), is related to what in philosophy is called, since Leibniz, the assumption of an "actual" infinity. An actual continuum cannot be translated into the illustration of a continuous line; it can be expressed only in a discrete illustration like that of a ring whose consistency depends on a symbolically prepared ground, a specific field of algebraic numbers. For an actual infinity, the relation between problems and their solutions is not absolute (either solvable or not). Instead, the mathematical formulation of a problem forms, together with the identification of a particular domain over which the solutions ought to range (which we could call a particular rationality), a particular solution space. Such a solution space can be of diverse capacity, depending on the complexity and level of abstraction that informs and is considered in the formulation of a problem. On the other hand, if we assume an infinity completed in terms of cardinals, whose total amount can be expressed as an explicit value (i.e., as measured, with no need of being rendered denominable and decipherable by encryption), we must not deal with a diversity of competing solution spaces, each of which can be—and must be—discreted in numerous ways. Instead, we find ourselves in one real space that determines with quasi-material force what formulation of a problem is solvable or not. Let us return now to Ferreiros's portrait of the disputes between our two protagonists—let's call them *Dedekind the interpretant of the oracle's voice* (an algebraist computing how the reality of judgment can be postponed by "dis-cipherment" [*Verrätselung*]), and *Cantor the constructivist prophet* (a geometer of paradise). "In late 1873, came a surprising discovery that fully opened the realm of the transfinite. In correspondence with Dedekind, Cantor asked the question whether the infinite sets *N* of the natural numbers and *R* of real numbers can be placed in one-to-one correspondence. In reply, Dedekind offered a surprising proof that the set *A* of all algebraic numbers is denumerable (i.e., there is a one-to-one correspondence with *N*)."¹⁷⁸

Both were thinking about the set of all sets, the universal set. But Cantor wanted that set to be "real," not "actual" (as Dedekind does), and he wanted the reality of this most powerful set to be coextensive, in cardinal terms, with the set of natural numbers. Dedekind, on the other hand, ascribing a discrete actuality to any one of the conceivable infinities (sets), also wanted this most powerful set to be coextensive with the set of natural numbers, but in the manner of ordinal values. For him, the universal set was the total of all sets of algebraic numbers; it was the power set of the actual infinities that algebraic number sets are capable of comprehending. Hence, he also called his universal set a totient, highlighting thereby its operational and ordinal character. For

¹⁷⁸ Ibid.

Dedekind, the universal set comprehends “the totality of all things that can be objects of my thought.”¹⁷⁹ Set theory for Dedekind is a means of discreting (from the German *ermessen*) the materiality of ideality, we could perhaps say. For Cantor, on the other hand, it is, inversely so, a means of measuring (from the German *vermessen*) the ideality of materiality. Philosophically speaking, we have very different kinds of humanisms here. Dedekind is famous for his saying: “We are of divine sex [*Wir sind göttlichen Geschlechts*] and without doubt possess creative power not merely in material things (railroads, telegraphs), but quite specially in intellectual things.”¹⁸⁰

Cantor’s humanism, on the other hand, would insist vehemently that humankind does not share the same sex as the divine—or rather, that the divine is omnipotence without sex, whole and self-sufficient—while human beings do not possess creative powers at all. Humans are the Divine’s creature, its toy or possession. Human thought can only reproduce the reasoning of divine order, it cannot actively participate in it. This is different for Dedekind. For him, the intellect is coextensive with the universe (the universal set). For Cantor, the totality of the divine intellect’s creation—Nature, which is there only once—is coextensive with the universe (the universal set, the set of all sets). For Cantor, nature is vaster than what the human intellect can grasp; for Dedekind, the collective intellect of all that is of the divine sex is vaster than what actually manifests in physical form, and vaster than any individual can ever grasp. For him, mathematics is still the art of learning, not the technique of how we can know. Some decades later, Kurt Gödel expressed in his own manner what seems to be the same problem: “Either mathematics is too big for the human mind,” he suggested, “or the human mind is more than a machine.”¹⁸¹ Surely what Gödel meant was a mechanical machine, not a thermodynamic one or a quantum-physical (electronic) one; but this would be a discussion that leads us astray here. The sole point I wish to make by mentioning it is that much of the strong feelings for or against technics—whether we adore it and see in it a manifestation of natural truth, or whether we hate it and see in it mere manipulation and impoverishing degeneration from natural truth—it all depends on how we think about the nature of number and the nature of intellect. So considered, the difference between the algebraist and the geometer is a theological one. That is why Cantor’s attempt to prove Dedekind wrong, by means of mathematics, makes such a strong point, but not about either one of them being objectively “right” or “wrong.” Ferreiro explains: “A few days later [after Dedekind sent him the proof that the

179 Richard Dedekind, *Was sind und was sollen die Zahlen?* (Braunschweig: Vieweg, 1888).

180 Richard Dedekind, “Brief an Weber,” in *Gesammelte Mathematische Werke*, vols. 1–3, ed. R. Fricke, E. Noether, and Ö. Ore (Braunschweig: Vieweg, 1930–32), 3:488–490; my translation.

181 Cited in David Bergamini, *Mathematics* (New York: The Life Science Library, 1963), 53.

set of all algebraic numbers is denumerable], Cantor was able to prove that the assumption that R is denumerable leads to a contradiction. To this end, he employed the Bolzano-Weierstrass principle of completeness mentioned above. Thus he had shown that there are more elements in R than in N or Q or A , in the precise sense that the cardinality of R is strictly greater than that of N .¹⁸² The strong point of Cantor’s attempt to disqualify Dedekind regards the power that abstractions hold over how one thinks about what it means to think. And this is a problem at the very heart of the idea that nature, in its uniqueness, can be purified against culture and the latter’s diversity.

182 Ferreirós, “Early Development of Set Theory.”